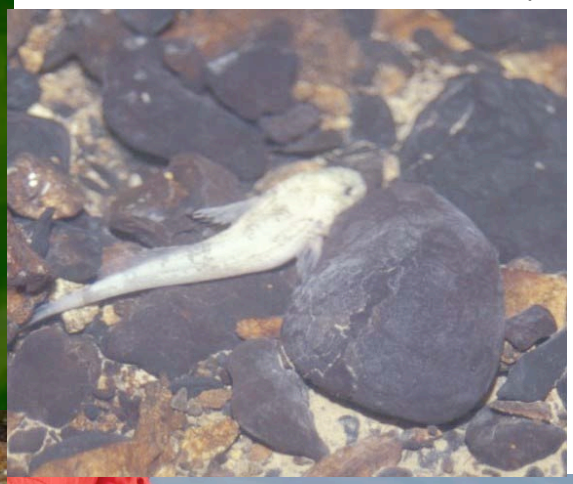
Missouri's Threatened and Endangered Species Accomplishment Report

July 1, 2004- June 30, 2005

Virginia sneezeweed

Grotto sculpin



Ozark hellbender

Lake sturgeon

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Threatened and Endangered Species Action Plans

ACCOMPLISHMENTS: July 1, 2004 – June 30, 2005

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SUMMARY HIGHLIGHTS

THE GOOD NEWS

- Another new population of running buffalo clover was discovered at Cuiver River State Park. The population discovered at Graham Cave State Park last year still appears to be doing well.

- Extensive surveys of geocarpon and bladderpod indicate both species are doing well. The populations of decurrent false aster at Columbia Bottoms CA, Confluence State Park, and USCOE Spatterdock Bottoms are increasing.

- More surveys were conducted on Virginia sneezeweed and populations are now found in 6 counties, including wild populations on 2 Conservation Areas and introduced populations on 2 CAs. Most populations are doing well and the introduced populations show signs of recruitment.

- Surveys for mussels revealed new locations for scaleshell and spectaclecase.

- Propagation and augmentation of 4 species of mussels were conducted.

- 67 Tumbling Creek cavesnails were observed upstream from the usual monitoring transect. Survey and monitoring efforts from the last 3 years resulted in no cavesnails, with mounting concerns that this species had become extinct.

- The St. Louis Zoo Invertebrate Department was successful in propagating over six hundred adults of the endangered American burying beetle. Surveys to find an extant population are underway, and a reintroduction plan is being drafted for potential future reintroduction efforts.

- There was a rediscovery of grotto sculpin in Running Bull Cave in the Perry County Karst System. This is the cave that experienced a mass mortality of grotto sculpins in 2001. The cave was sampled on two different occasions and 9 and 35 individuals were found respectively. It is unknown whether these individuals survived the pollution event in 2001, or if they emigrated from another cave system.

- Five more Hine's Emerald dragonfly sites have been discovered – 4 in 2004 and 1 in 2005.

- MDC authorized the purchase of property for the protection of 1) Hall's bulrush and other sand prairie species, 2) spring cavefish, and 3) Ozark cavefish.

- After several years of providing information to the FWS and demonstrating proactive conservation efforts, Missouri was notified in 2004 that it would be excluded from federal critical habitat designation for the Topeka shiner since such a designation would provide no additional protection for the fish.

THE NOT-SO-GOOD NEWS

- Monitoring efforts for Mead's milkweed and the western prairie-fringed orchid indicate that both species are still at very low numbers with not much recruitment.

- Survey for Curtis' pearlymussel from the past 4 years resulted in no live or recently dead individuals. Although a few more surveys will be conducted in 2005-2006, the existence of this species in Missouri is questionable.

- The fourth year of a ten year monitoring program for sturgeon, including pallid sturgeons, was completed. Fewer pallid sturgeon were collected. New regulations and permits regarding sport and commercial harvest of sturgeon are proposed for the Missouri and Mississippi Rivers.

- Missouri's resident prairie chicken population was surveyed on all known booming grounds. Although a slight increase in numbers was noted, due largely to the population associated with Dunn Ranch in NW MO, most native MO populations continue to decline.

CHANGES TO THE ACTION PLAN

- Higgins eye pearlymussel has been removed from the Action Plan. Since Missouri is on the southern edge of its range, and no living individuals have ever been found in Missouri (only one recently dead individual was found in 1986 near Hannibal), the US Fish and Wildlife Service decided not to reintroduce this species to the Missouri portion of the Mississippi River.

- One species, the Lake sturgeon, was added to the Action Plan.

FUNDING

- Seven Section 6 projects were implemented/completed:
    1. The Status and Viability of Populations of Three Federally Listed Plants in Missouri (Year 1 of 2; $34,000)
    2. Propagation and Restoration of Mussel Species of Conservation Concern (Year 2 of 3; $45,000)
    3. Tumbling Creek Survey and Contaminant Study (Year 3 of 4; $5000)
    4. Hine's Emerald Dragonfly: search for additional populations and confirmation of larval use at new and existing sites (Year 3 of 5; $17,400)
    5. A Survey of Endangered and Special Concern Mussel Species in the St. Francis and Black Rivers in Southeastern Missouri (Final Report submitted)
    6. Propagation and Hormone Induced Ovulation and Spawning of Topeka Shiners in Hatchery Ponds (Final Report submitted)
    7. Programmatic Candidate Conservation Agreements with Assurances for the Eastern Massasauga Rattlesnake (Final Report submitted)

- Wildlife Diversity Funds were used to fully fund 5 projects:
    1. Lake Sturgeon Habitat Use - Pilot Study ($15,700)
    2. Pond Renovations in Preparation for Topeka Shiner Reintroduction ($4000)
    3. Water Quality Monitoring in Perry County Cave Systems for Grotto Sculpin ($39,000)
    4. Water Quality Monitoring for Ozark Cavefish ($63,500)
    5. Restoring the Tumbling Creek Cave Gate ($17,800)

- State Wildlife Grant assisted in partial fund for the following conservation efforts:
    1. Surveys for mussels, spring cavefish, hellbenders, aquatic turtles, and plains spotted skunks
    2. Delineation of 4 Ozark cavefish recharge areas
    3. Improve technology of the Anabat system to detect bats (Indiana and gray bats)
    4. Niangua darter monitoring at a replaced low water crossing site (State Wildlife Grant - Osage River Project).
    5. Habitat improvement for prairie chickens
    6. Coordination of the Endangered Species Program

- Other funding sources contributed as follows:

1. St. Louis Zoo funded captive breeding efforts for American burying beetle and hellbender at the zoo.
2. USFWS Private Stewardship Grant ($60,000) and a Missouri Conservation Heritage Foundation Grant ($159,300) contributed to habitat restoration of scaleshell, spectaclecase, and sheepnose mussels on private land.
3. The owner of Tumbling Creek Cave purchased a nearby highly degraded farm to restore habitat and reduce sedimentation into the cave. This action will have positive benefits for the Tumbling Creek cavesnail.
4. The Spring River Watershed 319 Project for Lawrence County (managed by NRCS) completed several conservation projects with landowners that will improve habitat for Neosho madtoms.
5. In an effort to improve Niangua darter fish passage, a low water crossing on Thomas Creek in Dallas County was replaced using funds from the USFWS Fish Passage Program and the Missouri Conservation Heritage Foundation's Stream Stewardship Trust Fund. Two additional low water crossing replacement projects, one on the Little Niangua River in Hickory County and one on Little Tavern Creek in Miller County, are under-way.
6. Four stream crossings were installed in Niangua darter habitat using USFWS Challenge Grant and MDC cost-share funds. Livestock exclusion fencing and riparian corridor re-establishment was completed using CRP funding – also benefiting the Niangua darter.
7. USFWS Partners in Fish and Wildlife Program, the MDC Private Lands Services Cost Share Program, and the MDC Wildlife Division Landowner Incentive Program contributed to habitat restoration funding on private land for Tumbling Creek cavesnails, Ozark cavefish, Arkansas darter, Neosho mucket, scaleshell mussel, and greater prairie chicken.
8. The U.S. Corps of Engineers funded a three year pallid sturgeon demographics study which was conducted by the MDC Big Rivers and Wetlands field station ($273,740). The Corps also funded year one of a pallid sturgeon assessment study on the Missouri River ($630,002). The U.S. EPA funded a two year project to study the fish community of the Missouri and Mississippi Rivers ($275,890). These efforts will provide useful information on the pallid sturgeon in the Missouri and Mississippi Rivers.

9. Surveys for hellbenders on eight rivers within the USFS boundaries were conducted. Funds for these surveys were provided by USFS ($10,000).
10. A cave gate was constructed at Martin Cave #1, a Priority Two hibernaculum on Ozark National Scenic Riverways in Shannon County. The project was funded by MDC through a cooperative agreement with the Cave Research Foundation in partnership with private landowners and the National Park Service.

Threatened and Endangered Species Action Plans

ACCOMPLISHMENTS: July 1, 2004 – June 30, 2005

PLANTS

Common name: **Decurrent false aster**	Scientific Name: *Boltonia decurrens*
State Status: Endangered	Federal Status: Threatened
Goals: Management and Protection	Recovery Leader: Mike Arduser

The two known populations on public land in eastern St. Charles County have been monitored about 5 times in the last 10 years and are relatively secure. Both sites are owned by the U.S. Corps of Engineers (COE) and have management plans. Under the Federal Recovery Plan (1990), Missouri has met several of the objectives that will lead to recovery of this species. In the next five years the Department plans to

- maintain suitable habitat for the decurrent false aster on General Plan Lands owned by the COE and managed by MDC
- work with partners to assist in the implementation of the COE Decurrent False Aster Management Plan for Riverlands Environmental Demonstration Area
- continue to collaborate with MO Dept of Transportation (MODOT) to implement their 5-yr mitigation plan at West Alton as part of the Spatterdock Bottoms population
- monitor each of the two known populations at least once, and if population has declined, repeat the following year
- contact private landowners near known populations to conduct surveys and provide management guidelines when needed
- collaborate with Illinois agencies/institutions on a unified monitoring and research program

ACCOMPLISHMENTS

The Columbia Bottom CA planted population of decurrent false aster, discovered in the summer of 2003 in a former agricultural field (estimated at that time to include about 100 plants), has grown to an estimated 1,000 plants. *B. asteroides* has experienced a similar increase in numbers at this site, and hybrids (*B. decurrens x B. asteroides*) are also frequent here. Permanent transects have been established, and this population will be monitored in the fall of 2005 and again in 2006. No additional locations for decurrent false aster have been found on Columbia Bottom in the past year.

Similarly, the population at the Ed and Pat Jones Confluence State Park has grown exponentially to several thousand plants. The population at Spatterdock Bottoms disked by MDC staff in February 2004 has likewise responded vigorously and will be monitored in September of 2005.

An increased understanding of the plant's biology, largely a result of the research by Dr. Smith and her students, has shown some of the goals and objectives in the original recovery plan to be inappropriate and/or unattainable. Thus the USFWS has assembled a team of biologists to rewrite the recovery plan. The first meeting was held on October 19, 2004. Representative agencies, etc. include: MDC, USACOE (recovery leader), IDNR, USFWS, and SIU.

Common name: **Geocarpon**	Scientific Name: *Geocarpon minimum*
State Status: Endangered	Federal Status: Threatened
Goals: Monitor and Management	Recovery Leader: Tim Smith

There are 24 extant populations in Missouri that are secure and with no immediate threats to most populations. The federal Recovery Plan was finalized in 1993. During the next five years the Department plans to

- annually monitor two populations on public lands (COE and MODOT), St. Clair and Dade counties
- update the status of at least one population per year
- conduct surveys for new populations around Truman Lake in Henry County
- continue to work with COE and MODOT to advise on management and protection strategies for populations found on their property
- cooperate with the Center for Plant Conservation (CPC) to conduct genetic studies on Missouri populations
- work with regional biologists and resources managers to work with private landowners to develop voluntary management/conservation agreements
- investigate opportunities to collaborate with TNC on statewide monitoring efforts
- initiate and implement the Section 6 project:

  E-1-43: The Status and Viability of Populations of Three Federally Listed Plants in Missouri

ACCOMPLISHMENTS

The Section 6 survey study was initiated this year. A full time temporary biologist was hired and extensive surveys of geocarpon sites were conducted during the spring of 2005. Twenty-eight sites were visited, of which 23 were documented in the Heritage Database as known geocarpon sites. The species was observed at 20 sites for a total of 32,837 plants. One new location was documented, containing 200 plants. For Heritage Database purposes, it was combined with a previously known, nearby site. Next year, the search will be expanded to hopefully locate new populations.

In August 2004, a second attempt was made to relocate soil, hopefully containing geocarpon seed, from private land west of Bluff Springs C.A. (Cedar County) to the geocarpon relocation plots at the Conservation Area. The plot was established in August 2003. In April of 2005, the relocation plots were revisited and monitored for geocarpon. Although only one of the relocation plots had geocarpon, the number of plants was 40, a more than three-fold increase over the 14 plants present at the 2004 monitoring. Monitoring will continue each spring for several more years but no more soil transfers are currently planned.

Permanent plots at Flint Hill Glades (Dade County) were monitored in April 2005 by Central Missouri State University. These plots were originally established in 1994 and had been monitored by MDC staff. It is hoped that CMSU will continue to monitor the populations. Additionally, MDC and CMSU will analyze and publish a summary of the ten-year monitoring study.

The permanent plots at Collins Glade, the site owned by MODOT in St. Clair County,

were not monitored; however, the entire site was visited as part of the Section 6 study. 2360 plants were counted, which makes it the 6th largest known population.

Common name: **Hall's bulrush**	Scientific Name: *Schoenoplectus hallii*
State Status: Species of Concern	Federal Status: Region 3 Species of Concern
Goals: Monitor, Research, and Protection	Recovery Leader: Bob Gillespie

Although widely distributed, this species is rare throughout its range due to habitat specificity. A status review has been completed, and this species may be considered for candidate status. In Missouri, Hall's bulrush is known from two sites in Howell County and one site in Scott County. All three sites are on private land, and in 2000, one of the sites disappeared, probably due to drought conditions. It is unknown whether the population is extirpated or whether there is a sufficient seed bank to naturally re-establish the population under improved conditions. In the next five years, the Department plans to

- consider land acquisition within the sand prairie region of southeast Missouri or investigate alternative protection methods such as voluntary conservation easements, or pre-listing agreements with private landowners
- visit private land populations every other year to assess status
- develop Best Management Practices based on results from Section 6 study
- offer field identification training to field biologists and other resource managers, including Westvaco biologists
- collect seed or plants from one established population and plant at a more secure site
- work with Westvaco to establish a population on their land in Scott County

ACCOMPLISHMENTS

Land acquisition within the Scott County sand regions continued to be aggressively pursued. A 200 acre parcel of land is in the process of being procured through the MDC Realty Section and will provide localities to protect *S. halli* on public land. Conservation easements and agreements with private landowners have been explored and implemented particularly on landholdings of Charleston Baptist Camp and with one private landowner.

Management for Hall's bulrush and other sand prairie species continued at Charleston Baptist Association Camp in Scott County. Annual lease agreements will continue to provide opportunities for seed collection. Monitoring of this population continued.

Unfortunately, weather patterns in southeast Missouri have not produced flood events conducive to a Hall's Bulrush germination flush for the 2005 growing season. Southeast Missouri has been drought-stricken for the spring and summer months and conditions have only improved recently due to weather patterns brought about by an unusual early hurricane landfall. As a result, *S. halli* will be difficult to monitor this summer.

Common name: **Mead's milkweed**	Scientific Name: *Asclepias meadii*
State Status: Endangered	Federal Status: Threatened

Goals: Monitor and Management	Recovery Leader: Emily Kathol

Although additional populations have been discovered in recent years, the long-term condition of many populations in Missouri is not clear and many of the Missouri populations are not sexually reproducing. About half of populations in Missouri (29 of 59 known populations) are protected on publicly managed land or by a conservation organization. During the next five years the Department plans to

- annually monitor populations on Paint Brush Prairie Natural Area in Pettis County to evaluate and determine Best Management Practices and cooperate with monitoring and restoration efforts by The Nature Conservancy (TNC) on Wah-Kon-Tah Prairie and other sites
- update the status of known populations in MO
- request the Service to finalize the federal Recovery Plan and assist with its implementation
- train field biologists and other resource managers on proper identification
- establish a Mead's milkweed working group to share information and recommend research, monitoring and management efforts
- initiate and implement the Section 6 project:

  E-1-43: The Status and Viability of Populations of Three Federally Listed Plants in Missouri

ACCOMPLISHMENTS

The Section 6 survey study was initiated this year. A full time temporary biologist was hired and in the spring of 2005 a total of 35 known locations of Mead's milkweed were surveyed. Seven of these prairies contained stems. These prairies included Niawathe Prairie (89 vegetative stems, 9 flowering and 4 pods developed), Paintbrush Prairie (38 vegetative stems, 1 flower), Wah' Kon-Tah Prairie (42 vegetative stems, 3 flowers), Gayfeather Prairie (1 vegetative stem), South Fork Prairie (11 vegetative and 4 flowering), Taberville Prairie (3 vegetative) and Regal Prairie (6 vegetative, 5 flowers and 1 pod). The total for 2005 is 212 plants, with 22 flowers and 5 seed pods. Seed will be gathered in Aug. 2005 from Niawathe Prairie and from the St. Francis Mountains for use in future propagation efforts. Surveys on public and private land prairies will continue in 2006.

At Mina Sauk Falls in the St. Francis Mountains (Iron County), 14 of 20 visible stems were flowering. Eight of the original tagged plants were dormant and new plants were discovered which had not been previously marked.

In April, 156 tubers of Mead's milkweed were planted at the Wah Kon Tah nursery. The majority of the plants were planted in a bed that was tilled and sprayed with a pre-emergent herbicide, the plants were planted and then covered with wheat straw as mulch. The remaining plants were planted in a bed with Prairie dropseed for the purpose of studying how well the plants do with competition from other native species. The plants came from a study conducted at Morton Arboretum in Lisle, IL, by Marlin Bowles. The goal is to grow these plants, allow them to produce seed, use the seed to develop additional plants. The first introduction of plants could take place as early as spring 2007 or 2008.

Beginning in 1983 a detailed monitoring survey of Mead's milkweed was initiated at Niawathe Prairie and continued over the next three years. At that time, locations of individuals and clusters of Mead's milkweed were recorded and permanently marked. Since the initial monitoring study, no further surveys were conducted. However, in June, MDC staff relocated

and remarked these locations and additional Mead's milkweed clusters were discovered and marked for future monitoring efforts.

A Missouri Mead's milkweed working group was established in February 2004 to discuss the recently completed federal recovery plan and what aspects of the plan we can implement in Missouri. Agencies represented on the working group include MDC, DNR, USFWS, and TNC. A second meeting will be conducted in the summer of '05 to develop additional Action Plan items and to discuss locations for future plant introduction.

Common name: **Missouri bladderpod**	Scientific Name: *Lesquerella filiformis*
State Status: Endangered	Federal Status: Endangered
Goals: Survey, Monitor and Management	Recovery Leader: Mike Skinner

Urbanization and competition with exotic plants are impacting some populations, but the populations appear to be stable. The federal Recovery Plan was completed in 1988, and in 1998 MDC petitioned the FWS to reclassify this species as Threatened. The Service assigned a Tier 4 Priority Action, but to date, no action has been taken. During the next five years the Department plans to

- annually monitor permanent plots at Rocky Barrens CA in Green County to track population trends and evaluate the effects of management
- update the status of at least 10 populations per year, so that all 50 populations are visited in the next 5 years
- conduct a prescribed burn on Rocky Barrens during August in 2002 if possible
- train field biologists and other resource managers on proper identification and management
- request that the Service reclassify this species to Threatened status
- conduct prescribed burn on Bois D'Arc CA in August 2004 if possible
- work on elimination of sericea and Johnson grass infestations at Rocky Barrens CA
- initiate and implement the Section 6 project:

  E-1-43: The Status and Viability of Populations of Three Federally Listed Plants in Missouri

ACCOMPLISHMENTS

The Section 6 survey study was initiated this year and a full time temporary biologist was hired. In the spring of 2005, 36 populations were found on 51 sites, including one new site in Greene County. Total plants seen were estimated to be 207,664. This information will be updated in Heritage through the fall and winter of 2005-2006.

Although the population at Rocky Barrens CA was visited in November 2004 and basal rosettes were recorded, monitoring efforts of the plots were permanently discontinued in 2005 in lieu of the more extensive area survey in spring 2005 and subsequent years. A burn was not conducted in 2004, but is planned for August 2005 to remove more of the remaining vegetative layer and enhance the germination rate. Ten acres of the invasive species, S*ericea lespedeza* and Johnson grass, were sprayed again at Rocky Barrens, and this effort will continue for the foreseeable future. In addition, 10 acres of limestone glade were cleared of eastern red cedar and honey locust at Rocky Barrens CA, and

Ten acres of limestone glade that were cleared of eastern red cedar and honey locust at Bois D'Arc CA in 2003 were revisited in April 2005 for bladderpod populations. None were found.

Common name: **Pondberry**	Scientific Name: *Lindera melissifolia*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor and Management	Recovery Leader: Tim Smith

This species is known to occur in scattered populations across the southeastern US. The only natural population in Region 3 occurs in southern Missouri in Butler County. The federal Recovery Plan was completed in 1993. In the next five years the Department plans to

- monitor every other year the experimental population of seedlings on Corkwood CA in Ripley County
- annually update the status of the natural population on Sand Pond CA and Nancy B. Altvater Pondberry Preserve (TNC)
- train regional foresters to identify this species and look for them in southeast Missouri

ACCOMPLISHMENTS

Because MDC staff visited the pondberry population at Sand Pond C.A. and the Altvater Pondberry Preserve in March of 2004, and verified that a healthy population of pondberry persisted at the site, the site was not visited during FY05.

In June of 2005, a privately owned site was surveyed in the St. Francis River basin of Dunklin Co. The area, a sandy-soiled bottomland forest, was assessed for the suitability of pondberry. A similar site was also visited in Arkansas that contained populations of pondberry, also in the floodplain of the St. Francis River. While the habitat at the two sites were not a perfect match, the similarity of the two areas gives hope that, with more survey work, pondberry may eventually be discovered in the MO portion of the St. Francis River basin. Access is difficult but additional survey work in that area is probably warranted. Perhaps an aerial survey during flowering would be an efficient method of survey.

A set of identification cards for Plants of Conservation Concern in the Ozark Region was developed and distributed by MDC in spring of 2005. The set of cards includes a color photo and description of pondberry and should help land managers to develop a search image for the species.

Common name: **Running buffalo clover**	Scientific Name: *Trifolium stoloniferum*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor, Management, and Education	Recovery Leader: Tim Smith

Missouri is on the western edge of the range of this species and has two small natural populations, one on private land in Madison County, and one on public land in Maries County. In addition, more than 25 experimental plantings on MDC land have been attempted but few have persisted. In the mid-1990s, state representatives met with the Service to review the federal Recovery Plan and provide updated criteria for recovery. Because it appeared this species was doing well in most of its range, it was recommended that this species be reclassified as Threatened. In the next five years, the Department plans to

- annually monitor the remaining experimental populations
- annually monitor the two naturally occurring populations
- distribute identification materials and offer identification training to field biologists and other resource managers

ACCOMPLISHMENTS

During May, several MDC, DNR, and USFWS staff surveyed the clover plants at Graham Cave State Park. Plants were in good flower. A new fifth subpopulation was found near the previously documented sites and a total of 94 rooted nodes with 135 flowering stems were observed. A recent specimen collected at Cuivre River SP was confirmed to be running buffalo clover, and that population was found to contain 112 rooted nodes and 41 flower heads.

In early June, MDC staff visited a privately-owned site in Madison County. Twenty rooted crowns and 18 flower heads were counted at that site, a number very similar to the 2004 observation. Additional clearing of shade-producing brush was cleared from the area around the plants.

In May 2005, MDC staff visited two of the clover planting sites where transplanting of greenhouse-grown clover plants was done in the early 1990s. No plants were found at the Indian Trail C.A. site but 21 rooted nodes were found at Woodson K. Woods C.A. No flowering stems were present.

A set of identification cards for Plants of Conservation Concern in the Ozark Region was developed and distributed in spring of 2005. The set of cards includes a color photo and description of running buffalo clover and should help land managers to develop a search image for the species.

MDC continues to provide information for the ongoing revision of the Running Buffalo Clover Recovery Plan. Completion of the Recovery Plan should lead to the reclassification of the species from endangered to threatened.

Common name: **Western prairie fringed orchid**	Scientific Name: *Platanthera praeclara*
State Status: Endangered	Federal Status: Threatened
Goals: Monitor and Management	Recovery Leader: Tom Nagel

Three extant populations are known from Missouri. All three populations are on property owned and managed by MDC in Harrison, Atchison, and Holt counties. Controlled greenhouse experiments have been conducted to determine seed germination success and other life history parameters that may aid in future reintroduction efforts. The federal Recovery Plan was completed in 1996. In the next five years the Department plans to

- annually monitor all three sites to establish long term population trends (Tarkio Prairie CA, Little Tarkio Prairie CA, and Helton Prairie NA)
- encourage Best Management Practices on all three sites
- buffer existing native prairies where this species occurs by establishing and maintaining prairie Areconstructions@ nearby with native ecotype seed
- search for remnant quality prairies in north and southwest Missouri and provide management assistance to willing landowners if new populations of this species are discovered on private land
- if new populations are discovered on private lands**,** when possible, develop safe harbor agreements with private landowners to restore suitable habitat
- in partnership with TNC, inventory for the species on Pawnee Prairie CA and Dunn Ranch Preserve

ACCOMPLISHMENTS

All three sites were monitored for flowering and two of the three sites were monitored for leaf emergence of western prairie fringed orchids in the spring. Sixteen orchids were found emerging at Little Tarkio Prairie on April 25. Only one was found in flower at this site on June 13. Thirty nine western prairie fringed orchids were found emerging at Tarkio Prairie on April 26; 24 were found in flower and 19 were vegetative for a total of 23 orchids found at this site on June 20. Helton Prairie was not checked for emerging leaves in the spring, but on June 20, a total of 21 plants were found: 19 plants were in flower (most pollinaria gone), one was in bud (but not likely to bloom), and one was vegetative.

Two additional surveys were conducted during the period when the western prairie fringed orchid was in flower or starting to set seed. One was on Pawnee Prairie CA, a private prairie in Clinton County with potentially suitable habitat, and the other on a cemetery prairie in Linn County. Plants were not found at either site.

All three prairies (Tarkio, Little Tarkio, Helton) were managed according to MDC Best Management Practices. The former crop field north of Little Tarkio Prairie Natural Area (planted with a native mix of forb and grass seed in the spring of 2004 to buffer the higher quality prairie) was mowed in 2005 to encourage the establishment of young seedlings. A small patch of *Sericea lespedeza* was discovered and treated on Little Tarkio Natural Area in late summer of 2004 and will be monitored and treated again in 2005 if necessary. In addition to invasive species control, management efforts on Little Tarkio Prairie Natural Area also included a prescribed burn on March 3, 2005.

Helton Prairie was not burned in FY05. A reconstructed prairie immediately east of the Natural Area, planted as a buffer several years ago, was burned in late winter, 2005.

Tarkio Prairie Natural Area was burned on March 14, 2005. Tree removal, using a Fellar Buncher, was continued on areas to the east of the natural area and select areas were also brush-hogged to set back woody growth and continue restoring prairie there. In addition, treatment of crown vetch adjacent to Tarkio Prairie Natural Area has begun in the summer of 2005. Sericea lespedeza next to Tarkio Prairie Natural Area was treated in August, 2004.

Common name: **Virginia sneezeweed**	Scientific Name: *Helenium virginicum*
State Status: Endangered	Federal Status: Threatened
Goals: Survey, Protection, and Education	Recovery Leader: Rhonda Rimer

Contingent upon resolution of lingering taxonomic questions, there is one potential location of this species in Missouri in Howell County on private land and highway right-of-way. In the next five years the Department plans to

- conduct additional surveys in sinkhole ponds and wet meadows in region
- inform and provide technical assistance to private landowners
- cooperate with CPC to protect the species through seed and living collections
- monitor reintroduced populations on public land in the area
- produce informational brochures
- offer identification training to field biologists and other resource managers

ACCOMPLISHMENTS

During 2005, the north and south units of the population at Pomona (Howell County) were monitored. Plants were doing well and the private landowners did not hay their field until well after the plants had gone to seed.

Plants reared from seed collected in 2001 and introduced to two sites on public land (Howell and Oregon Counties) in March and September of 2003 were monitored. Survivorship remains close to 90% and new basal rosettes were observed at new spots around both reintroduction sites. One plant was observed in flower, indicating successful reproduction of reintroduced plants in only two years.

Ongoing botanical surveys of sinkholes and wet meadows led to the discovery of 10 new sites in 2005. With these new discoveries, Virginia sneezeweed is now known from six counties in the Ozarks (Howell, Oregon, Shannon, Wright, Ripley, Texas, and Webster. Importantly, two of these sites were located on publically owned land (Sunklands Conservation Area, Shannon County). As a result, the Missouri Department of Transportation and botanists in Arkansas are conducting additional surveys.

A set of identification cards for Plants of Conservation Concern in the Ozark Region was developed and distributed in spring of 2005. The set of cards includes a color photo and description of Virginia sneezeweed and should help land managers to develop a search image for the species.

A manuscript detailing information on all the new sites, along with geospatial site information, is currently in review.

MOLLUSKS

Common name: **Curtis' pearlymussel**	Scientific Name: *Epioblasma florentina curtisi*
State Status: Endangered	Federal Status: Endangered
Goals: Survey	Recovery Leader: Steve McMurray

This species is known only from Missouri and Arkansas and is extremely rare in both states. In Missouri, its total range in 1980 was less than 14 miles of streams and has continued to decline

throughout the 1980s. Only one male has been found since 1993, despite several search attempts. It is assumed extirpated from the state and is on the brink of extinction. In the next five years the Department plans to

- conduct status assessments in the Black River of Missouri

  SE-01-36, A Survey of Endangered and Special Concern Mussel Species in the St. Francis and Black Rivers in Southeastern Missouri
- participate in a survey of selected watersheds in Arkansas and Missouri within the historic range of Curtis' pearlymussel to determine if it still exists in the last potential locations for this species, and if found, develop a protection and propagation plan for future reintroductions.

ACCOMPLISHMENTS

The final report for the Survey of Endangered and Special Concern Mussel Species in the Sac, Pomme de Terre, St. Francis, and Black River in Missouri was completed in September 2004. In summary, a total of 51 sites were visited in the Black River drainage between May and September 2003. Sampling effort averaged 2.15 hours per site and totaled 109.5 person-hours. Curtis' pearlymussel, found only in the Little Black River, was not observed live or as shell material at any of the sites surveyed.

In addition to the basin surveys conducted from 2001-2003, surveys of selected streams in Arkansas and Missouri were conducted in the summers of 2004 and 2005 to search for living individuals. This survey work as conducted with staff from Arkansas State University, Arkansas Department of Transportation, Missouri State University, USFWS, and MDC. No live individuals or shells of Curtis' pearlymussel were observed during these surveys. Additional surveys are scheduled to occur during calendar year 2005.

Common name: **Fat pocketbook mussel**	Scientific Name: *Potamilus capax*
State Status: Endangered	Federal Status: Endangered
Goals: Survey and Protection	Recovery Leader: Steve McMurray

In the 1980s, an experimental population of fat pocketbook mussels introduced into the Mississippi River was largely unsuccessful. In 1997, a small population was rediscovered from a three mile stretch of the Belle Fountain Ditch in southern Dunklin County in the Bootheel. During the next five years the Department plans to

- conduct status assessments in Missouri

  SE-01-36, A Survey of Endangered and Special Concern Mussel Species in the St. Francis and Black Rivers in Southeastern Missouri
- reassess and monitor the Belle Fountain Ditch population found in 1997 and develop a protection plan with the appropriate Drainage District
- evaluate the potential for artificial propagation or augmentation

ACCOMPLISHMENTS

The final report for the Survey of Endangered and Special Concern Mussel Species in the Sac, Pomme de Terre, St. Francis, and Black River in Missouri was completed in September 2004. In summary, during 2002, 7732 mussels representing 42 species were collected from 32

mainstem and 23 tributary sites in the St. Francis River basin. During 2003, 9189 mussels representing 42 species were collected from 31 mainstem and 20 tributary sites in the Black River basin. No fat pocketbooks were observed during either of these surveys.

Due to the status of the fat pocketbook, the USFWS, Arkansas Field Office, is considering a fat pocketbook plan for controlled propagation, augmentation, and reintroduction. MDC provided comments on the plan.

Common name: **Higgin's eye pearlymussel**	Scientific Name: *Lampsilis higginsi*
State Status: Endangered	Federal Status: Endangered
Goals: Establishment	Recovery Leader: Travis Moore

The Higgin's eye has been found in Missouri only on rare occurrences in the Upper Mississippi River (UMR) near Hannibal. In the next five years the Department plans

- cooperate with the US Army Corps of Engineers - St Louis and Rock Island Districts, USFWS, and Illinois DNR on issues associated with this species.

ACCOMPLISHMENTS

Since Missouri is on the southern edge of its range, the US Fish and Wildlife Service decided not to reintroduce this species to the Missouri portion of the Mississippi River. Only recently dead individuals have ever been found and no *living* Higgin's eye have been found in Missouri. Therefore, this species will be removed from the Missouri Threatened and Endangered Action Plan.

Common name: **Neosho mucket**	Scientific Name: *Lampsilis rafinesqueana*
State Status: Species of Concern	Federal Status: Candidate
Goals: Research and Management	Recovery Leader: Scott Faiman

The Neosho mucket was added to the FWS Candidate List in 2001 due to declining numbers. Although its threats are not fully understood, captive propagation techniques have been determined and augmentation of juveniles back into streams is possible. During the next five years the Department plans to

- coordinate with researchers to determine fish host and other life history parameters necessary for artificial propagation and augmentation of non-reproducing populations

E-1-42: Propagation and Restoration of Mussel Species of Concern

- identify areas in Missouri where otters or other predators are posing threats to existing populations of Neosho muckets. If such areas are located, monitor some of these areas on annual basis to determine survivorship of marked individuals. If compatible, use this study to monitor key populations of Neosho muckets.
- identify other threats to key populations of Neosho muckets and general threats to watersheds containing Neosho muckets.

ACCOMPLISHMENTS

Through contract with Missouri State University (MSU) and in cooperation with the MDC Chesapeake Hatchery, six female Neosho muckets, collected from the Spring River at Carthage, MO on July 7, 2004 and July 27, 2004 were used in propagation efforts at Chesapeake Hatchery on July 14, 2004 and August 2, 2004. A total of 660,000 juveniles were harvested and released in August 2004 at four sites in the Spring River (Carthage, Stott City, Otter Kill and Hoberg).

The recirculating propagation system (RPS) designed and constructed at MSU was used for collection of juveniles from the captive fish hosts in these 2004 Neosho mucket propagation efforts.

Propagation of this species will continue in July and August 2005.

Common name: **Pink mucket**	Scientific Name: *Lampsilis abrupta*
State Status: Endangered	Federal Status: Endangered
Goals: Survey and Research	Recovery Leader: Steve McMurray

The status of populations in select watershed basins in Missouri has been recently assessed and additional surveys are needed. Future status assessments should include information on reproductions and recruitment to identify populations which may benefit from artificial propagation and augmentation. During the next five years the Department plans to implement the following actions outlined in the 1985 federal Recovery Plan:

- coordinate with researchers to determine fish host and other life history parameters necessary for artificial propagation and augmentation of non-reproducing populations

E-1-42: Propagation and Restoration of Mussel Species of Concern

- assess the current status in the lower Osage River below Bagnell Dam
- provide technical guidance to AmerenUE, a private electric company, during the federal relicensing process to protect and enhance populations impacted by Bagnell Dam
- monitor selected populations in parts of the lower Meramec River

ACCOMPLISHMENTS

The final report for the Survey of Endangered and Special Concern Mussel Species in the Sac, Pomme de Terre, St. Francis, and Black River in Missouri was completed in September 2004. In summary, live pink muckets collected in the Sac and Black rivers from 2001 to 2003. A total of 35 sites were surveyed in the Sac River, and 2 live females and 1 weathered dead shell were collected. In the Black River basin, 31 mainstem and 20 tributary sites were surveyed for mussels, and 4 live pink muckets were collected from 4 separate locations.

Cooperative efforts between Missouri State University (MSU) and MDC are currently underway to propagate pink mussels using facilities at Lost Valley Hatchery (LVH) and MSU. A total of 225,000 pink muckets were propagated at MSU and released at two sites in the Meramec River. Smallmouth bass successfully tested as hosts for pink muckets. In addition, results suggest that year-old fish may be less suitable for propagation than young-of-the-year fish. Additional efforts to propagate pink muckets are ongoing.

A settlement with Ameren UE, MDC, DNR, and the USFWS is still under negotiation for the reliscensing of Bagnell Dam. It is hoped that the settlement will improve habitat and water quality in the lower Osage River.

Common name: **Scaleshell**	Scientific Name: *Leptodea leptodon*
State Status: Endangered	Federal Status: Endangered
Goals: Research and Management	Recovery Leader: Rob Pulliam

The final rule listing the scaleshell mussel as endangered was published in 2001. It is found in the Meramec, Gasconade, and Missouri Rivers. In the next five years the Department plans to

- coordinate with researchers to determine fish host and other life history parameters necessary for artificial propagation and augmentation of non-reproducing populations

E-1-42, Propagation and Restoration of Mussel Species of Concern

- initiate restoration and evaluation efforts with landowners on the Little Bourbeuse River Brush Creek, and Lick Creek Watersheds and implement Best Management that will improve downstream habitat for the scaleshell
- monitor select populations in the lower Meramec and/or Gasconade rivers
- provide technical guidance to AmerenUE, a private electric company, during the federal relicensing process to protect and enhance populations impacted by Bagnell Dam operations

ACCOMPLISHMENTS

As part of the Section 6 Propagation and Restoration grant, cooperative efforts between Missouri State University (MSU) and MDC are currently underway to propagate scaleshell mussels using facilities at Lost Valley Hatchery (LVH) and MSU. MSU experimented with captive culture of juveniles and reported a 37% survival rate at 84 days before terminating the experiment. Blue catfish and river redhorse were tested as possible hosts, but tested negative. To date, only freshwater drum are known to be the host fish for scaleshell. In addition to ongoing efforts to propagate scaleshell, MSU provided glochidia to North Carolina State for toxicity testing.

The Little Bourbeuse River, Brush Creek, and Lick Creek landowner watershed advisory committee secured funding from two granting sources. This includes a Private Stewardship Grant for $60,000, and a Missouri Conservation Heritage Foundation Grant for $159,300. In addition to these funds, MDC staff spent an additional $99,400 of state funds to work with 18 landowners to improve watershed habitat using approved Best Management Practices. Practices mostly targeted erosion control through providing alternative livestock watering systems that keep cattle away from eroding streamside edges, fencing cattle out of riparian or woodland areas, planting riparian corridors with native trees or grasses, or installing erosion control fabric in critical areas of high use. These efforts contributed to the restoration of habitat for scaleshell, spectaclecase, and sheepnose mussels.

A settlement with Ameren UE, MDC, DNR, and the USFWS is still under negotiation for the reliscensing of Bagnell Dam. It is hoped that the settlement will improve habitat and water quality in the lower Osage River.

Common name: **Sheepnose**	Scientific Name: *Plethobasus cyphyus*

State Status: Endangered	Federal Status: Candidate
Goals: Surveys, Research, Management	Recovery Leader: Kenda Flores

The sheepnose, already state listed as endangered, was listed as a FWS candidate species in May, 2004. In Missouri, it is found in the Meramec, Bourbeuse, and Osage Fork of the Gasconade rivers. Found in other states as well, the sheepnose has been eliminated from two-thirds of the streams from which it was historically known and only four of the remaining populations appear to be viable. In the next five years the Department plans to

- survey for new populations and revisit/monitor previously known populations when possible
- initiate discussions with FWS and state mussel experts on potential threats to this species in Missouri and identify restoration efforts with landowners to apply Best Management Practices on private property where appropriate
- determine the need to further identify host species and initiate artificial propagation efforts
- gather information pertinent to Missouri populations to determine high priority recovery actions

ACCOMPLISHMENTS

Discussions were initiated between the MDC staff from the Lost Valley Hatchery and mussel recovery leaders on identification of host species and future surveys for populations of sheepnose mussels.

Prior to initiating streambank erosion control management efforts on private property along the Meramec River, assistance was provided to landowners to ensure proper permit procedures were followed to avoid any adverse affects on nearby sheepnose populations.

The Little Bourbeuse River, Brush Creek, and Lick Creek landowner watershed advisory committee secured funding from two granting sources. This includes a Private Stewardship Grant for $60,000, and a Missouri Conservation Heritage Foundation Grant for $159,300. In addition to these funds, MDC staff spent an additional $99,400 of state funds to work with 18 landowners to improve watershed habitat using approved Best Management Practices. Practices mostly targeted erosion control through providing alternative livestock watering systems that keep cattle away from eroding streamside edges, fencing cattle out of riparian or woodland areas, planting riparian corridors with native trees or grasses, or installing erosion control fabric in critical areas of high use. These efforts contributed to the restoration of habitat for scaleshell, spectaclecase, and sheepnose mussels.

Common name: **Snuffbox**	Scientific Name: *Epioblasma triquetra*
State Status: Endangered	Federal Status: Species of Concern
Goals: Research	Recovery Leader: Steve McMurray

In March 2000, this species was added to the Missouri endangered species list. Rare throughout its range, it is a federal species of concern. The range of the snuffbox was once widespread, but in the last 50 years, its range has shrunk. In Missouri, there are fewer than an estimated 1000 individuals remaining. In the next five years the Department plans to

- coordinate with FWS, other agencies, and universities to develop artificial propagation techniques in MDC hatcheries, and if successful, augment the snuffbox population in the Bourbeuse River.
- initiate watershed restoration projects with private landowners to implement Best Management Practices that will improve habitat for snuffbox mussels.
- monitor selected populations in parts of the lower Meramec River.

ACCOMPLISHMENTS

In 2005 snuffbox mussels were successfully propagated at Lost Valley Hatchery (LVH) using 3 gravid individuals captured from the Bourbeuse River at Peter's Ford during April 2005. Propagation efforts were conducted during June 2005 with all three females. Glochidia were removed from the mussels and placed in suspension with host fish (logperch). After inoculation, fish were held in a specialized aquarium system at LVH until the glochidia transformed into juveniles and dropped off these fish. An estimated 15,400 juveniles (86.5% recovery rate) produced from this effort were released into the Bourbeuse River at Peter's Ford on 16 June 2005. Tissue samples for DNA analysis were taken from both females.

Survey efforts on the Bourbeuse River during summer 2005 will help to determine additional occurrences of snuffbox.

The Little Bourbeuse River, Brush Creek, and Lick Creek landowner watershed advisory committee secured funding from two granting sources. This includes a Private Stewardship Grant for $60,000, and a Missouri Conservation Heritage Foundation Grant for $159,300. In addition to these funds, MDC staff spent an additional $99,400 of state funds to work with 18 landowners to improve watershed habitat using approved Best Management Practices. Practices mostly targeted erosion control through providing alternative livestock watering systems that keep cattle away from eroding streamside edges, fencing cattle out of riparian or woodland areas, planting riparian corridors with native trees or grasses, or installing erosion control fabric in critical areas of high use. These efforts contributed to the restoration of habitat for scaleshell, spectaclecase, sheepnose, and snuffbox mussels.

Common name: **Spectaclecase**	Scientific Name: *Cumberlandia monodonta*
State Status: Species of Concern	Federal Status: Candidate
Goals: Surveys and Management	Recovery Leader: Rob Pulliam

The spectaclecase was listed as a FWS candidate species in May, 2004. In Missouri, it is found in the Meramec, Bourbeuse, Big, Big Piney, Gasconade, and Osage Fork of the Gasconade rivers. The spectaclecase was historically known from 45 streams in 15 states, but is now only known from 20 streams in 10 states. Of the 20 streams, 7 represent records of single specimens. In the next five years the Department plans to

- survey for new populations and revisit/monitor previously known populations when possible

- initiate discussions with FWS and state mussel experts on potential threats to this species in Missouri and identify restoration efforts with landowners to apply Best Management Practices on private property where appropriate
- determine the need to further identify host species and initiate artificial propagation efforts
- gather information pertinent to Missouri populations to determine high priority recovery actions

ACCOMPLISHMENTS

During the 2004 summer Ozark hellbender survey, 15 new spectaclecase mussel locations were discovered on the Big Piney River and 3 were found on the upper Gasconade River.

The Little Bourbeuse River, Brush Creek, and Lick Creek landowner watershed advisory committee secured funding from two granting sources. This includes a Private Stewardship Grant for $60,000, and a Missouri Conservation Heritage Foundation Grant for $159,300. In addition to these funds, MDC staff spent an additional $99,400 of state funds to work with 18 landowners to improve watershed habitat using approved Best Management Practices. Practices mostly targeted erosion control through providing alternative livestock watering systems that keep cattle away from eroding streamside edges, fencing cattle out of riparian or woodland areas, planting riparian corridors with native trees or grasses, or installing erosion control fabric in critical areas of high use. These efforts contributed to the restoration of habitat for scaleshell, spectaclecase, and sheepnose mussels.

Common name: **Tumbling Creek Cavesnail**	Scientific Name: *Antrobia culveri*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor and Protection	Recovery Leader: Bill Elliott

This troglobitic snail is restricted to one location in Missouri on private property. Populations appear to have declined despite considerable protection by a conservation minded private landowner. During the next five years the Department plans to

- investigate other caves and groundwater habitats in surrounding areas for TCCS
- investigate potential threats to the cave and species

E-1-41, Tumbling Creek Survey and Contaminant Study

- coordinate with FWS, the Ozark Underground Laboratory, and Missouri Western State College to conduct population monitoring and life history studies
- continue census work on gray bats in Tumbling Creek Cave
- collaborate with NRCS/SWCD/FWS to implement Best Management Practices along private stream frontage in the Tumbling Creek Cave recharge area
- investigate long term land protection options in the Tumbling Creek Cave recharge area (conservation easements, additional acquisitions)

ACCOMPLISHMENTS

MDC's cave conservation program staff took 18 field trips to Tumbling Creek Cave from July 2004 through June 2005. Trips included field work as well as participating in meetings of

the cavesnail working group. The group met on May 22-23, 2005, at Ozark Underground Laboratory. On May 23 Paul Johnson and Stephanie Clark from the Tennessee Aquarium Research Institute observed 67 cavesnails when they crawled upstream from the usual transect. This good news gives hope for attempting a captive propagation study in the cave in the future, once a suitable surrogate species is tested in the lab.

Little progress was made in the Tumbling Creek Survey and Contaminant Study due to the contract laboratory having difficulty with their laboratory instruments. No SPMDs (semi-permeable membrane device) were analyzed. Extractions of two POCIS (polar organic chemical integrative sampler) were made, and we are seeking another laboratory to analyze the extracts for a list of polar compounds.

Since the removal of an internal cave gate and the construction of the large chute gate at the natural entrance in March 2004, the population of gray bats has increased to 21,000-37,000. Increased input of gray bat guano may be important for the long-term recovery of the cavesnail.

MDC awarded $2,500 grant to the Cave Research Foundation to search for potential cavesnail caves in Taney County. Eleven cavers participated with a candidate list of 35 caves. They checked 23 caves and three springs. Five caves had gravelly streams, but are probably not enough extensive enough to support cavesnails. Six caves will need to be reinvestigated. Two of the best caves which appeared to have the highest potential for Tumbling Creek cavesnails were extensively searched but were void of any aquatic snails. Further cave searches in western Ozark County, within a few miles of Tumbling Creek Cave, will be conducted in 2005-06.

The owner of Tumbling Creek Cave purchased a nearby highly degraded farm. MDC and the FWS provided cost-share funds to assist them with replanting 67,000 trees to restore eroded habitat. Through another cost-share project with the National Park Service, the owners are clearing the land of trash, which was dumped or buried in several places. These projects probably are already helping to clear the cave stream of sediments, and may be aiding in the reappearance of cavesnails.

MDC, using Wildlife Diversity Funds in FY06, along with local partners, will be working with the Mark Twain School, located within the watershed, to correct a leaking sewage lagoon that could be affecting the cave ecosystem. A modern treatment system is expected to be installed in 2006.

Common name: **Winged mapleleaf**	Scientific Name: *Quadrula fragosa*
State Status: Endangered	Federal Status: Endangered
Goals: Survey	Recovery Leader: Steve McMurray

The winged mapleleaf has not been found in Missouri since 1920 despite a limited survey conducted in northeastern Missouri in 1991. In June 2000, a live individual that looks very much like the listed species was found in the Bourbeuse River. Positive identification has not yet been confirmed through genetic analysis. Given the possibility that positive identification of the above-mentioned specimens may be forthcoming, in the next five years the Department plans to

- work with experts to determine whether the specimen found in the Bourbeuse River is *Q. fragosa* or an aberrant form of *Q. quadrula*

- conduct more surveys in appropriate habitat throughout the historic range if specimen is verified as *Q. fragosa*

ACCOMPLISHMENTS

Based on the confirmation that the specimen found in the Bourbeuse River was a winged mapleleaf, a proposal was written in 2005 and funds were successfully obtained through the Wildlife Diversity Funds to initiate a status survey in Fiscal Year 2006. The objectives of the project are to survey select streams in the proposed range of *Q. fragosa* and to develop a predictive model on where winged mapleleaf are likely to be extant, then to ground truth the model by conducting a survey of potential sites with timed, qualitative techniques.

INSECTS

Common name: **American burying beetle**	Scientific Name: *Nicrophorus americanus*
State Status: Endangered	Federal Status: Endangered
Goals: Survey	Recovery Leader: Mike Arduser

The American burying beetle was federally listed Endangered in 1989, and at that time was known only from Rhode Island and Oklahoma. In Missouri, the last American burying beetle specimens reported from the state were collected in Newton County in the mid-1970s and in Jasper County in the early 1980s. A very limited survey in the late 1980s was unsuccessful at relocating this species, as was a more intensive survey effort on prairie remnants in southwest Missouri in 2001. Since 1989, intensive survey efforts have successfully located the species in several Midwest states, including Kansas, Arkansas, Nebraska and South Dakota. Continued intensive survey efforts in Missouri could identify existing populations. In the next five years the Department plans to:

- coordinate surveys with universities, zoos, museums, or qualified individuals for the American burying beetle following techniques used by biologists in Arkansas, Kansas and Nebraska
- coordinate surveys with Southwest Missouri State University for the American burying beetle following techniques used by biologists in Arkansas, Kansas and Nebraska
- if found, conduct population assessment(s) of American burying beetle at extant sites
- if found, conduct long-term monitoring (i.e., five years as identified in recovery plan) of selected sites as appropriate
- identify current and potential threats to the existing populations and develop Best Management Practices guidelines
- conduct identification training for field biologists and other natural resource managers

ACCOMPLISHMENTS

In 2004-2005, the St. Louis Zoo Invertebrate Department acquired beetles from the wild in Arkansas, and from a lab colony at Ohio State University (Oklahoma stock), and began to breed, raise, and display the beetles. The program has been successful with over six hundred adults produced in 2005. Fifty pair were delivered to Ohio in June 2005 as part of that state's reintroduction program, and St. Louis Zoo staff participated in the reintroduction process.

Early in 2005, The Nature Conservancy (TNC) and Missouri Department of Natural Resources (MDNR) expressed an interest to reintroduce the American burying beetle (ABB) to some of their properties in western Missouri. A meeting to discuss reintroduction of the ABB in Missouri was convened in Columbia, MO in April, and included staff from the USFWS, MDNR, MDC and the St. Louis Zoo. A follow-up meeting was held at the TNC office in St. Louis with MDC and the St. Louis Zoo. It was agreed that the Zoo and TNC would draft an American burying beetle reintroduction plan for Missouri. The plan is being drafted at this time.

St, Louis Zoo staff will conduct several ABB surveys in August and September of 2005.

Common name: **Hine's emerald dragonfly**	Scientific Name: *Somatochlora hineana*
State Status: Endangered	Federal Status: Endangered
Goals: Survey, Research, and Education	Recovery Leader: Bob Gillespie

The Hine's Emerald Dragonfly was federally listed in January 1995, and at that time, it was only known from Illinois, Michigan, and Wisconsin. In June 1999, the Hine's Emerald was discovered in Reynolds County, MO (Grasshopper Hollow Natural Area) and resurveyed and verified in August 2000 and June 2001. In July 2001, two new populations were discovered in Reynolds County. In the next five years the Department plans to

- conduct additional surveys in suitable habitat

  SE-1-40, Hine's Emerald Dragonfly: search for additional populations and confirmation of larval use at new and existing sites
- coordinate with TNC to protect recharge areas of Grasshopper Hollow State Natural Area through acquisition, conservation easements, or conservation management agreements
- utilize existing private landowner incentive programs for the protection of privately owned deep muck fens through fencing and Alternative Watering Systems where appropriate
- determine the life history, demography, and habitat use of the Hine's emerald dragonfly and related Somatochlora dragonflies in Missouri
- conduct morphological and genetic studies within and between populations and genera
- determine potential adverse impacts to adults or larvae
- develop educational materials and fen management guidelines for private landowners
- Actively participate as a member of the Hine's Emerald Recovery Team
- offer identification training to field biologists and other resource managers

ACCOMPLISHMENTS

MDC continues to contract Hine's emerald dragonfly (HED) survey work under the Section 6 project. Four new sites were discovered in the summer of 2004, and one site was discovered as of July 2005 bringing the total number of Missouri sites to18. One new 2004 HED site is within the previously known range of HED in MO and within only two miles from Grasshopper Hollow State Natural Area, the largest known reproductive site for HED in MO. It appears that the combination of these two sites remain the most important refugia for HED in MO.

We have not documented that reproduction is occurring at most of the HED sites. It is likely that some of these sites (where only adults have been found), will not have larvae. Thus the status of HED in Missouri may be more tenuous than the number of sites would indicate. Consequently, larval surveys at these "adults only sites" is a very important priority. The Section 6 proposal was extended for an additional 2 years and will focus more effort on larval surveys. Several additional private sites still merit surveys for adults and use of the burrow pump to locate larvae in fens will continue into the fall months.

Analyses of National Wetland Inventory maps and online resources have led to the discovery of unique fen and fen-like communities. Some of these sites have been "groundtruthed", or assessed for their suitability as HED habitats. Surveys for suitable fens will continue in FY06.

In order to control degradation of the Barton Fen caused by beaver activity, construction of a Clemson leveler (coupled with trapping) was completed. This was a cooperative effort between staff of the USFS Potosi Ranger District and MDC. A prescribed fire was also completed at Barton Fen in April 2005 which effectively removed thatch and killed encroaching woody species. Adult HED were observed at the site on follow-up monitoring trips to Barton Fen.

The Centerville Hwy 21 bridge construction, which began in 2004, was completed in 2005. Consultations between MODOT, MDC, and USFWS successfully avoided any adverse affects of the bridge and construction on HEDs. The ownership of Centerville Slough has changed and we are currently working closely with the landowner to protect the sensitive features located on the property.

FISH

Common name: **Arkansas darter**	Scientific Name: *Etheostoma cragini*
State Status: Species of Concern	Federal Status: Candidate
Goals: Survey and Management	Recovery Leader: Tim Banek

The Arkansas darter is widespread and common in small streams of southwest Missouri, and there is no indication of a recent general decline in distribution or abundance and is apparently secure within the state. However, anticipated increases in urbanization and livestock production may affect it in the future. In the next five years the Department plans to

- continue to improve habitat quality in the Spring River basin through riparian and watershed management
- collate and analyze trend data to provide to FWS
- request that FWS review the status of this species for potential removal from the Candidate List or request guidance for actions that would contribute to future removal of Arkansas darters from the Candidate list

ACCOMPLISHMENTS

The paper *Status and Distribution of the Arkansas Darter, (Etheostoma cragini) Gilbert, in Southwest Missouri* by Matthew Combs was provided to the USFWS lead recovery leader in Arkansas. The paper confirms that Arkansas darters are relatively abundant and widespread throughout their Missouri range. MDC personnel suggest convening a meeting in Missouri to discuss the status and management of the darter. Information shared from participants from each of the five states within the Arkansas darter's range could be used to determine the appropriate FWS listing.

Landowner assistance with stream and riparian corridor concerns in the Spring River Basin of southwest Missouri by Fisheries and Private Land Services Divisions is ongoing. Cost share funds designated to assist private landowners with implementing best management practices (BMPs) were utilized to address riparian and stream problems as requested.

Southwest Region Fisheries Division and Policy Coordination staff continued to review and, as appropriate, comment on various permit applications (e.g., Section 401 and 404 of the Clean Water Act) to address any impacts the actions might have on Arkansas darters and their habitat.

Common name: **Crystal darter** **Longnosed darter**	Scientific Name: *Crystallaria asprella* *Percina nasuta*
State Status: Endangered	Federal Status: Region 3 Species of Concern
Goals: Survey	Recovery Leader: To Be Named

Neither of these species has ever been common. Surveys conducted during the summers of 1999 and 2000, 11 crystal darters were collected in the Black River, 13 in the Meramec River, and 2 in the Gasconade River. Longnosed darters were historically known from the White River in Taney and Stone Counties (now covered by Table Rock and Bull Shoals reservoirs) and from

the middle St. Francis River. In 2003, 30 sites on the St. Francis River were sampled and 12 adults, 1 juvenile longnose darters were collected. In the next five years the Department plans to:

- initiate and/or continue surveys in the known range of both darters to assess the extent of occurrence of these species
- develop and implement a monitoring plan
- train staff fisheries biologists in identification for future survey and monitoring efforts
- identify threats (sources of sedimentation?) and develop appropriate actions to alleviate threats
- determine future needs for these species

ACCOMPLISHMENTS

The Recovery Leader resigned from MDC and a new Recovery Leader has not yet been designated. No actions were accomplished during FY05.

Common name: **Flathead chub**	Scientific Name: *Platygobio gracilis*
State Status: Endangered	Federal Status: Region 3 Species of Concern
Goals: Survey	Recovery Leader: Vince Travnichek

This species has been declining from Missouri River tributaries since the 1980's, although it seems to be more stable in neighboring states. In the next five years the Department plans to

- conduct a status survey using the newly developed BENTHIC trawl method on the Mississippi and Missouri Rivers
- formulate a 10-year species plan in conjunction with the U.S. Geological Survey (USGS), COE, and the USFWS
- cooperate with US Army COE to promote and assist in restoration of suitable habitat in Mississippi and Missouri River side channels

ACCOMPLISHMENTS

MDC staff with responsibilities along the Missouri and Mississippi Rivers continues to meet with US Army COE staff to discuss continued restoration and creation of suitable side channel and shallow water habitat along both rivers. Such efforts will benefit not only flathead chub, but other big river fish as well. MDC continues working with USGS, USFWS, and state conservation agencies from Montana, South Dakota, Iowa, and Nebraska and has developed a long term monitoring program on the Missouri River funded by the COE. This monitoring program will document changes in abundance of species that are of concern along the entire length of the Missouri River related to changes in Missouri River flows and habitat enhancement.

Implementation of monitoring began in portions of the river during 2003, and MDC received funding ($3.1 million for next five years) during 2005. MDC is also working with the COE to begin monitoring recently created shallow water habitat related to the Pallid Sturgeon Biological Opinion report. This habitat may have benefits for this species.

A final report for a project funded by MDC to the University of Missouri examining shallow water nursery habitats of riverine fishes will be completed in 2005. This project may identify nursery habitats important to this species. Another project funded by MDC to MU was

initiated during spring 2004. This project will examine shallow water habitat importance to juvenile fishes and adult small bodied fishes that may have implications for this species. Finally, MDC recently received funding from EPA to monitor both the Missouri and Mississippi fish communities. Field work (electrofishing and trawling) was conducted during summer 2004 and will continue through 2005. Information from these surveys will give MDC needed information on status of this species.

Common name: **Grotto Sculpin**	Scientific Name: *Cottus sp., sp. nov.*
State Status: Endangered	Federal Status: Candidate
Goals: Management and Protection	Recovery Leader: Brad Pobst

The Grotto sculpin, endemic to caves in Perry County, was listed as a federal candidate species in 2002 and assigned a priority number of 2. Due to the unstable nature of the cave environment in Perry County it is imperative to understand the basic biology of Grotto sculpins and the factors influencing their ability to repopulate caves in response to catastrophic event (e.g., a contaminant spill). During the next two years the Department plans to

- begin a long term water quality monitoring project in four know caves that have populations of Grotto sculpins
- determine population size and habitat use of Grotto sculpins
- quantify movement of individuals within a cave system
- determine the genetic structure of Grotto sculpins in different cave systems
- provide a more complete picture of groundwater connectivity
- secure funding for further recharge area evaluations
- develop educational materials and hold educational workshops
- work with other agencies to develop Best Management Practices and secure funding to manage sinkhole on private land
- work with the grotto clubs and invite them to participate in the recovery effort

ACCOMPLISHMENTS

The highlight of this year was the discovery of grotto scuplin in Running Bull Cave in the Perry County Karst System. This is the cave that experienced a mass mortality of grotto sculpins in 2001. Running Bull Cave is one of 5 caves systems known to contain the sculpins. The cave was sampled on two different occasions and 9 and 35 individuals were found respectively. It is unknown whether these individuals survived the pollution event in 2001, or if they emigrated from another cave system. This is one of the reasons that a high priority action item to protect this species is to understand the connectivity of these cave systems. To accomplish this objective, local sponsors applied for $194,000 through an EPA 319 Grant to fund recharge delineations of all of the major cave systems, hire a part time coordinator, continue water quality monitoring, and to clean out sink holes. We will be notified by September, 2005, if our grant was accepted.

Working with local grotto clubs, access has been secured and the long term water quality monitoring equipment has been placed into four known caves that have populations of grotto sculpin. These monitoring devices are starting to provide some valuable information on the water quality in these cave systems.

Funding has been secured to determine population size and habitat use of grotto sculpin and this project will begin in FY2006. Funding is still being sought to determine the genetic structure of grotto sculpins in different cave systems.

Common name: **Lake Sturgeon**	Scientific Name: *Acipenser fulvescens*
State Status: Endangered	Federal Status: None
Goals: Management	Recovery Leader: Brian Todd

Lake sturgeon historically occupied the Missouri and Mississippi River drainages but sightings continued to decline throughout the 1900's. The species is long-lived with some individuals exceeded 100 years and a weight of 200 pounds or more. They do not become sexually mature until approximately age 20. MDC began stocking this species in the mid-1980's and sporadic stocking (10 stockings over 20 years) has continued since then. To date, over 210,000 fingerlings have been reintroduced into the Mississippi and Missouri rivers. However, the population is still not self-sustaining. In the next five years the Department plans to

- implant sexually mature male lake sturgeon with radio transmitters over the next two years and track them to identify spring spawning sites and rest-of-year habitat use
- stock a target of 25,000 fingerlings annually (individuals hatched at the Genoa National Fish Hatchery in Wisconsin)
- continue to revise state regulations for protection of this species and work with Protection Division to enforce regulations
- initiate an awareness and appreciation campaign including a MO Conservationist article featuring the pilot telemetry study and results
- initiate the development of a sampling protocol to assess the population

ACCOMPLISHMENTS

A pilot project was initiated using Wildlife Diversity Funds. There were three objectives of this study: 1) begin to identify critical seasonal habitats for lake sturgeon in the Upper Mississippi River; 2) identify lake sturgeon spawning habitat in the Upper Mississippi River and its tributaries; and 3) evaluate techniques for capturing lake sturgeon through a literature search, personal communications, and subsequent field sampling.

A total of 102 lake sturgeons were sampled throughout the year from Pool 24. Most lake sturgeon were collected using deadset gill nets and trotlines. Seventy were sampled during the research project. Nine lake sturgeons were radio tagged. Habitat use of the nine fish was determined a total of 159 times. Main channel border and main channel were the most used habitat.

An extensive search from the Mark Twain Lake re-regulation dam to the mouth of the Salt River was conducted during the week of April, 6th. Water temperatures at this time were optimum for lake sturgeon spawning but none of our tagged fish were found in this tributary. Two lake sturgeons were located in the confluence of tributaries. These fish were not located at the same tributary nor were they using this habitat type during the same time period. After considerable tracking effort during the spring, no confirmed spawning sites were located in 2005.

7,335 lake sturgeons (6"- 8" long) were stocked into the Mississippi River; half stocked at Louisiana, Missouri and the other half at LaGrange, Missouri.

Live lake sturgeons were put on exhibit at the new Bass Pro Shop aquaria in Columbia, Missouri. MDC staff contributed significantly to the educational exhibit. In addition, MDC staff assisted in the revision of the lake sturgeon BMPs.

Common name: **Neosho madtom**	Scientific Name: *Noturus placidus*
State Status: Endangered	Federal Status: Threatened
Goals: Monitor and Management	Recovery Leader: Doug Novinger

The federal Recovery Plan was completed in 1991. Only a small portion of the Neosho madtom range occurs in Missouri in Spring River, and populations are small but presumably vulnerable. Efforts are underway to improve water quality in the Spring River watershed. During the next five years the Department plans to

- monitor the presence of this species in the lower Spring River
- investigate the possibility of using artificial riffles to reestablish habitat for Neosho madtoms
- complete the MO Department of Natural Resources/EPA Section 319 project in the Spring River Basin to improve water quality
- promote Best Management Practices throughout the basin

ACCOMPLISHMENTS

Annual monitoring of Neosho madtom populations, fish community, and habitat characteristics were conducted in the lower Spring River during October, 2004. The distribution, abundance, and population size structure of Neosho madtoms in 2004 was similar to 2003 and consistent with historical records. A total of 19 Neosho madtoms were captured in 4 of 8 sites. The fish was more likely to be found in the heads, tails, and toward the channel sides of riffles in moderately loose to moderately firm substrates that were the size of small pebbles (16-32 mm diameter). This corresponds to use of areas that have minimal deposition of fine silt or sand and would provide abundant habitat and likely food resources in the interstitial spaces of the unconsolidated matrix of small rocks. There was a general lack of association between Neosho madtoms and other species, including general measures of diversity.

The Spring River Watershed 319 Project for Lawrence County (managed by NRCS) completed the fourth of five years of funding and is on schedule to meet project objectives by June, 2006. Several conservation projects with landowners were completed including installation of 2 stack shed composters for poultry waste, 2 dairy waste management systems, reestablishment of 1.5 miles of riparian corridor, and development of 9 comprehensive nutrient management plans (CNMPs).

Promotion of best management practices in the basin is ongoing (e.g. 401 and 404 permit approval process) and included initiation of private land conservation projects by MDC staff. In addition, the lower Spring River watershed was identified as a Conservation Opportunity Area as part of Missouri's Comprehensive Wildlife Strategy (CWS). This will direct additional conservation funding and attention to the watershed and benefit Neosho madtoms and other species of concern that occur there.

Common name: **Niangua darter**	Scientific Name: *Etheostoma nianguae*
State Status: Endangered	Federal Status: Threatened
Goals: Monitor, Research, and Management	Recovery Leader: Craig Fuller

This species is endemic to the Osage River basin of the Ozarks and protection and recovery opportunities for the species are restricted to Missouri. Recovery of this species is being led by Craig Fuller, Recovery Team Leader, fisheries biologists in the Southwest, Kansas City and Central Regions, and biologists in the Resource Science Division. The federal Recovery Plan was completed in 1989 and critical habitat was designated. In 1998, a Section 6 study was completed (Mattingly and Galat - University of MO-Columbia) that provided ecological requirements needed by this species. In the next five years the Department plans to:

- conduct a Recovery Team meeting with the revised team membership in coordination with FWS
- continue the standardized ten year monitoring plan in 2004
- continue to define range expansions of currently known populations and search for new populations of Niangua darters
- continue to determine genetic lineages for all known Niangua darter populations as needed
- develop new educational material
- develop partnerships with other cooperating agencies to improve habitat
- work with Private Land Conservationists to promote forestry and stream Best Management Practices and secure additional funding for habitat restoration on private lands
- work with county commissions to replace or modify low water stream crossings for the purpose of improving fish passage and sediment transport by implementing the USFWS "Fish Passage Grant" and the Department of Interior "State Wildlife Grant-Osage River Basin"
- monitor the impact of low water crossing replacement projects on fish populations and habitat conditions

ACCOMPLISHMENTS

Standardized monitoring was completed throughout the range as designed. Final reports were completed for 2004 monitoring efforts. During 2004, 66 sites were surveyed among eight watersheds. A total of 176 Niangua darters were observed in 20 of 66 sites and located in five of the eight watersheds. Numbers of Niangua darters increased from 2003 in all but the Maries River watershed where counts declined steeply (-73%). Observation of a large number of age 0 fish suggests that spring 2004 was a particularly successful spawning season for Niangua darters.

Activities related to fish passage and low water crossing issues have become high priority. In 2004, a Top "10" list of low water crossings within Niangua darter range was developed. A low water crossing on Thomas Creek in Dallas County was replaced using funds from the USFWS Fish Passage Program and the Missouri Conservation Heritage Foundation's Stream Stewardship Trust Fund. Funds from the State Wildlife – Osage River Grant are being used to conduct monitoring at this location. Two additional low water crossing replacement projects, one on the Little Niangua River in Hickory County and one on Little Tavern Creek in Miller County, are under-way. Agreements and design plans for both projects have been completed. Construction is scheduled to be completed on both projects during the summer of

2005. All three of the low water crossing replacement projects have pre and post construction fish survey and channel morphology monitoring components associated with them. As a result of the pre-construction fish monitoring on Little Tavern Creek in Miller County, Niangua darters were observed in 2005. This is the first record ever of Niangua darters in this tributary to Tavern Creek.

A private landowner project was completed with Lucas Farms on Little Maries Creek in Osage County. Four stream crossings were installed using USFWS Challenge Grant and MDC cost-share funds and livestock exclusion fencing and riparian corridor re-establishment was completed using CRP funding.

Common name: **Ozark cavefish**	Scientific Name: *Amblyopsis rosae*
State Status: Endangered	Federal Status: Threatened

During the last five years MDC has taken the lead on rangewide coordination of data sharing and communication about this species. The federal Recovery Plan was completed in 1989, followed by the Missouri State Action Plan in 1999. Fisheries biologists and Private Land Conservationists in southwest Missouri are addressing management and educational efforts with private landowners. Additional cavefish populations have been discovered in recent years, but there is still some concern about the size, delineation, and quality of water in the recharge areas. During the next five years the Department plans to

- monitor at least 2 active sites alternately every two years
- continue with cavefish protection efforts on private land within known recharge areas with assistance from FWS and the MDC Landowner Incentive Program, and implement appropriate Best Management Practices
- determine habitat needs and water quality threats to cavefish populations
- prioritize and complete the remaining recharge area delineations
- secure funding for further recharge area evaluations
- coordinate the efforts of the state working group and determine the need to initiate formal cooperative efforts with appropriate partners to focus on cavefish recovery activities
- work with Private Land Conservationists to promote Best Management Practices and secure additional funding for habitat restoration on private lands

ACCOMPLISHMENTS

Staff conducted surveys to monitor populations of Ozark cavefish as detailed in the Ozark Cavefish State Action Plan. Data were collected to describe cavefish abundance and size distribution and occurrence of other cave fauna. Eight of the 13 accessible sites were visited and Ozark cavefish were observed in 4 of the sites. There were record high numbers observed in Capps Creek Well #1 (10) and Faye Valley Cave (14), including several small cavefish (< 2 cm long), suggesting that these populations had successful spawning seasons during 2004. Ozark cavefish were observed for the first time in a second well at Capps Creek (Well #2). Water and air temperature data from automated recorders was also collected that will allow for comparisons among several sites.

Both Fisheries Division and Private Land Services Division staff continued working with landowners within the range of the Ozark cavefish in southwest Missouri to address primarily groundwater and related stream and riparian corridor concerns. Additional cost-share funds,

focused on assisting private landowners in the karst regions of south Missouri in implementing BMPs, were made available by FWS late in 2001. Program implementation is ongoing.

Wildlife Diversity Funds were secured to initiate a project to intensively study water quality in the six highest priority Ozark cavefish sites. The goal of the project is to characterize current water quality conditions, identify immediate threats, and collect baseline data to be used to develop future monitoring plans. During FY2005, purchases included automated sampling instruments (six Hydrolabs) that measure water depth, temperature, dissolved oxygen, pH, conductivity, turbidity, chloride, ammonia, and nitrate hourly. Currently, the Hydrolabs have been deployed in 4 sites to collect pilot data.

The delineation of four recharge areas, along with vulnerability/hazard mapping was completed and the draft final report has been received. The final report is due this fall. This will complete recharge delineations for active sites in Missouri.

An informal discussion of progress and activities between working group members was conducted during the 2005 MNRC meeting in February 2005.

Southwest Region Fisheries Division and Policy Coordination staff continued to review and, as appropriate, comment on various permit applications (e.g., Section 401 and 404 of the Clean Water Act).

Common name: **Pallid sturgeon**	Scientific Name: *Scaphirynchus alba*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor, Research, Protection, Education	Recovery Leader: David Herzog

The federal Recovery Plan was completed in 1993, and the Department has been an active participant on the recovery team. Department efforts are led by a state management plan completed in 1995, but until the issues surrounding the Corps of Engineers Master Manual dictating the flow of the Missouri River are resolved, the Department is restricted in implementation of the plan. During the next five years the Department plans to

- participate on state and federal Recovery Team (Dave Herzog)
- track reports of tagged fish and monitor sport and commercial fishing to evaluate impacts of current regulations on the Missouri River
- identify and document the habitat requirements of pallid sturgeons
- continue to work with the COE on the Master Manual and other proposed changes to big river management that could benefit fish and wildlife resources
- produce and stock (if possible, from local broodstock) 3,000 pallid sturgeon annually in the lower Missouri and Mississippi Rivers
- develop a standardized monitoring program throughout both Missouri and Mississippi Rivers
- conduct a study on critical spawning, nursery areas and habitat needs
- provide additional educational materials about pallid sturgeon and threats to their survival
- continue to work with other state and federal agencies on riverine habitat protection, restoration and enhancement

ACCOMPLISHMENTS

A total of 13,650 excess pallid sturgeon from Garrison Dam National Fisheries Hatchery

were stocked into the lower Missouri River near Booneville during 2004 and 2005. An additional 2,345 excess pallid sturgeon from Garrison Dam National Fisheries Hatchery were stocked at Cooley Access in Clay County. There were no attempts to produce pallid sturgeon in MDC facilities from July 2004 through June 2005.

Several staff from MDC attended meetings and provided comments related to the restoration and protection of the pallid sturgeon. Presentations that focused on management and restoration of pallid sturgeon were given by MDC staff at the first annual Scaphirhynchus conference in St. Louis Missouri. Policy coordination staff attended several meetings regarding the pallid sturgeon biological opinion on the Mississippi and Missouri Rivers.

The fourth year of a ten year standardized monitoring program was completed in 2004. Monitoring continues to assess population trends of all sturgeon species as well as examine benefits of pallid and lake sturgeon stocking to wild populations. Fewer pallid sturgeon were collected during 2004/2005. At the same time, new regulations and permits regarding sport and commercial harvest of sturgeons are proposed for the Missouri and Mississippi Rivers.

The MDC Big Rivers and Wetlands field station is completing a three year Corps of Engineers funded pallid sturgeon demographics study. There were 25 pallid sturgeon captured and tagged from July 2004 through July 2005 by field station staff out of a total of over 2,400 sturgeon. Trot-lining efforts using night crawlers for bait have been the most effective technique for pallid sturgeon capture during the period November thru April in the Middle Mississippi River. Nearly 700 larval to young-of-year sturgeon were captured using the Missouri trawl and Mini-Missouri trawl. The majority of all larval to young-of-year sturgeon are captured from late May through June of each year. Pallid sturgeon have been captured with egg-check marks in this study. These check marks are used by some commercial fishermen to determine the readiness of the fish for harvest to support the caviar market. Over ten-thousand eggs were collected using drift nets and artificial substrates in an attempt to identify spawning sites for pallid sturgeon. Most of the collected eggs did not appear to be of *Scaphirhynchus* origin. Total funding over three years for this project was $273,740.

Telemetry efforts continue with Southern Illinois University and MDC. An array of over 20 stationary ultrasonic receivers was maintained along the Mississippi River from Cairo, Illinois through the Upper Mississippi River in Pool 26 and into the Missouri River. Pallid sturgeon were tracked moving from the Middle Mississippi River into the Missouri River during the spawning period and then returning into the Mississippi River during July 2005. MDC entered into an agreement with MoDOT to attach stationary telemetry receivers on Route 51 bridge piers on the Mississippi River. These attachments will serve as permanent data collectors for sonic-tagged pallid sturgeon. Ultrasonic receivers will be installed during summer 2005 pending river conditions.

The Great Rivers Environmental Monitoring and Assessment Program (EMAP) funded by EPA completed the first of two sampling years. This project uses electrofishing and the Missouri trawl to sample the fish community in the Missouri and Mississippi Rivers. Nearly 30 larval sturgeon were captured from July through September using the Missouri trawl. Funding for this project totaled $275,890.

MDC entered into an agreement with the U.S. Army Corp of Engineers funded Pallid sturgeon assessment study on the Missouri River. This effort will provide standardized data collections on the pallid sturgeon in the Missouri River. Funding for year one was $630,002.

Finally, a proposal was submitted for *Recovery Land Acquisition Grants* through the USFWS for acquiring Windy Bar, (a Mississippi River Island), to enhance and protect pallid

sturgeon habitat. The acquisition of the property is pending because of the sale of Westvaco—the timber company that owned the property.

Common name: **Sicklefin chub** **Sturgeon chub**	Scientific Name: *Macrhybopsis meeki* *Macrhybopsis gelida*
State Status: Species of Concern	Federal Status: Recently Removed as Candidate
Goals: Monitor and Restoration	Recovery Leader: Vince Travnichek

Although known from the shallower edges of the Missouri River, both species have recently been collected in the deeper channels of the Missouri and Mississippi rivers by using trawls. Sturgeon chubs have not declined significantly in the Missouri River in recent times, and data collected from 1997 suggest this species may be slightly increasing in number, although the data set is too short-term to be sure. Sicklefin chubs appear to be more abundant than the sturgeon chub and the species is probably stable at this time in Missouri, although there is some concern that this trend may be a sampling artifact. During the next five years the Department plans to

- continue to monitor the status of these species and develop a standardized monitoring program throughout both Missouri and Mississippi River
- formulate a 10-year species plan in conjunction with the COE, USGS, and the Service
- cooperate with COE to promote and assist in restoration of suitable habitat in Mississippi and Missouri River side channels
- continue to work with the COE on the Master Manual and other proposed changes to big river management that could benefit fish and wildlife resources

ACCOMPLISHMENTS

MDC staff with responsibilities along the Missouri and Mississippi Rivers continues to meet with US Army COE staff to discuss continued restoration and creation of suitable side channel and shallow water habitat along both rivers. Such efforts will benefit not only flathead chub, but other big river fish as well. MDC continues working with USGS, USFWS, and state conservation agencies from Montana, South Dakota, Iowa, and Nebraska and has developed a long term monitoring program on the Missouri River funded by the COE. This monitoring program will document changes in abundance of species that are of concern along the entire length of the Missouri River related to changes in Missouri River flows and habitat enhancement.

Implementation of monitoring began in portions of the river during 2003, and MDC received funding ($3.1 million for next five years) during 2005. MDC is also working with the COE to begin monitoring recently created shallow water habitat related to the Pallid Sturgeon Biological Opinion report. This habitat may have benefits for this species.

A final report for a project funded by MDC to the University of Missouri examining shallow water nursery habitats of riverine fishes will be completed in 2005. This project may identify nursery habitats important to this species. Another project funded by MDC to MU was initiated during spring 2004. This project will examine shallow water habitat importance to juvenile fishes and adult small bodied fishes that may have implications for this species. Finally, MDC recently received funding from EPA to monitor both the Missouri and Mississippi fish communities. Field work (electrofishing and trawling) was conducted during summer 2004 and

will continue through 2005. Information from these surveys will give MDC needed information on status of this species.

Common name: **Spring cavefish**	Scientific Name: *Forbesichthys agassizi*
State Status: Endangered	Federal Status: Region 3 Species of Concern
Goals: Survey, Monitor, Research, Protection	Recovery Leader: Bob Gillespie

Only two populations at a single locality are known for spring cavefish (*Forbesichthys agassizi*) in Missouri This population id found on private property in Scott County is the only population known from west of the Mississippi River. In 1992, a management plan was drafted for this population. Because of threats from water contamination from surface water, this species is listed as state endangered. In the next five years the Department plans to

- determine the feasibility of purchasing the area below the bluffs at the population site or protecting it through a conservation easement with the landowners
- restore hydrology of the site
- continue population biology studies to determine local distribution, size, and viability of population
- monitor ambient and long-term water quality conditions using data loggers
- conduct survey in the Benton Hills area to locate new populations or identify feasibility of locating alternative sites for introduction
- encourage Southeast Missouri Port Authority to develop an emergency response plan in the event of a significant spill or leak
- contact adjacent landowners to discuss management options to protect recharge zone surrounded by row crop agriculture

ACCOMPLISHMENTS

Both systematic monitoring and opportunitic monitoring of spring cavefish continued in 2004-2005. Twenty-three adult cavefish were observed at East Spring and 19 adult spring cavefish were recorded at West Spring during three sampling trips conducted during the late winter and early spring of 2005. Status of spring cavefish at both spring heads is similar to what was reported during the 2001-2002 study period. Large numbers of larvae were observed at East Spring and no evidence of reproduction was observed at West Spring. Both springs exhibited some evidence of nutrient loading with phosphorous levels at West Spring exceeding USEPA quality limit for lentic waters, a value of 2.75mg/L on 17 March 2005.

Wildlife Diversity Funds were secured in FY05 for a research project that will begin in FY06. The objectives of the project will determine 1) potential spring cavefish habitat in southeastern Missouri using topographic maps and previous data collected for spring cavefish in Illinois, 2) long-term stability of population abundance at West Spring, 3) condition of fish at East and West Springs during each survey and provide data on reproductive success, and 4) an extensive water quality analysis of East and West Spring.

Currently the MDC Reality Services is in the process of procuring the property of the only known site of this species. Rowcrop agricultural activities are still being conducted by the landowner on the marginal bottomland fields adjacent to the bluff line. The populations are

located in close proximity to industrial developments at SEMO Port Authority and Lonestar Aggregates. However, Lonestar Aggregates has limited interest in the property for expansion.

Common name: **Topeka shiner**	Scientific Name: *Notropis topeka*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor, Research and Management	Recovery Leader: Harold Kerns

Recognizing the decline of this species, MDC formed a state working group and listed the species as state Endangered in 1996. In 1999, this species was federally listed endangered and the Topeka Shiner State Action Plan was approved by MDC. This plan was utilized extensively in forming the draft Federal Recovery Plan (currently under review). Harold Kerns represents MDC on the federal Recovery Team. MDC staff are working with private landowners in Topeka shiner inhabited watersheds to implement practices benefitting the Topeka shiner. In the next five years the Department plans to

- annually monitor the status of this species in Moniteau Creek and Sugar Creek watersheds
- work with private landowners to encourage the use of forestry and stream Best Management Practices in Topeka shiner watersheds
- actively participate in the state working group and federal recovery team
- revise Topeka Shiner State Action Plan and continue to assist in the revision of the Federal Recovery Plan
- continue to work with the FWS on critical habitat issues
- continue public education efforts that demonstrate the connection between the Topeka shiner and good water quality
- draft the final report for the Section 6 study

SE-1-39: Propagation and Hormone Induced Ovulation and Spawning of Topeka Shiners in Hatchery Ponds

- refine captive propagation methodologies in accordance with the recovery plan/team, identify potential propagation sites, and survey potential suitable habitat for reintroduction that was not previously surveyed
- begin efforts to establish Topeka shiner populations in accordance with the state action plan and federal recovery plan

ACCOMPLISHMENTS

The sixth year (of 10 years minimum) of the annual Topeka shiner population monitoring of Moniteau Creek and Sugar Creek watersheds as identified in *An Action Plan for the Topeka Shiner (Notropis topeka) in Missouri* was completed. Bonne Femme Creek watershed has been dropped from annual monitoring since 2001, since Topeka shiners have not been collected in the watershed since 1997. Information on the potential for Topeka shiner collections from Bonne Femme Creek watershed as well as Hart, Jamerson, and/or Slate creeks prompted extensive surveying in these streams during the summer of 2004. No Topeka shiners were collected in any of these streams or their tributaries during this sampling effort.

Information was provided for the revision of the Topeka Shiner Best Management Practices (BMP) document. In addition, MDC continued working with Natural Resources

Conservation Service (NRCS) personnel on a guide sheet to identify possible NRCS cost share practices that might have beneficial or negative impacts on Topeka shiner and their habitats.

After several years of providing information to the FWS, Missouri was notified in 2004 that it would be excluded from federal critical habitat designation for the Topeka shiner since such a designation would provide no additional protection for the fish.

The state working group met to initiate the revision of *An Action Plan for the Topeka Shiner (Notropis topeka) in Missouri.* In addition, the *Propagation Plan for the Topeka Shiner in Missouri* was drafted by FWS with considerable input from MDC staff.

Ponds were surveyed on TNC's Dunn Ranch and MDC's Pawnee Prairie CA in Harrison County in anticipation as possible introduction sites. A WDF proposal was approved for funding to purchase piscicide, and ponds on both areas were successfully treated.

The final report, *Topeka Shiner Propagation Report, Grant E-1-39,* was completed, submitted, and approved.

REPTILES AND AMPHIBIANS

Common name: **Eastern massasauga**	Scientific Name: *Sistrurus catenatus catenatus*
State Status: Endangered	Federal Status: Candidate
Goals: Survey, Research and Management	Recovery Leader: Jeff Briggler

This species is only known from only three north Missouri sites, all on public lands. A rangewide management handbook was prepared and completed by the Eastern Massasauga Management Working Group in 2000. In the next five years the Department plans to

- draft the final report for the Section 6 study

E-2: Eastern Massasauga Candidate Conservation Agreement

- continue collaboration with Squaw Creek NWR, Swan Lake NWR, FWS, and Towson University, Maryland to monitor existing populations
- coordinate and conduct surveys on suitable habitat on selected MDC lands and other areas
- protect land adjacent to existing populations by purchase, conservation easements, or voluntary conservation agreements with landowners
- develop specific management actions for Missouri land managers
- if appropriate, participate in an interstate/interagency working group

ACCOMPLISHMENTS

The Massasauga CCA document, funded under Section 6 and USFWS-Columbia office discretionary funds was completed. There were many stumbling blocks to the development of a CCA document (outlined in final report), which eventually lead to a failure of this project in Missouri. USFWS Midwest office was provided with a final written report with draft CCA document, management guidelines, and trapping efforts. Two massasauga rattlesnakes were capture at Massasauga Flats Duck Hunting Club, an area adjacent to the Pershing State Park population. In addition, these funds were also used to survey Fountain Grove CA for massasauga rattlesnakes. Historically, this Conservation Area contained massasauga rattlesnakes. With intensive survey efforts (drift fencing and burn unit searches), no massasauga

rattlesnakes were discovered. Final reports from the Fountain Grove CA survey were provided to MDC Federal Aid office and USFWS Columbia office.

MDC staff continues to cooperate with Squaw Creek NWR, Swan Lake NWR, Pershing State Park, and researchers from Towson State University (Maryland). A two day survey of Pershing State Park in early April yielded 150 massasauga rattlesnakes. Wildlife Diversity Funds were obtained in FY2005 to provide additional surveys at Pershing State Park in spring 2006.

The Midwest Massasauga Rattlesnake symposium was held at Squaw Creek NWR on 26 March 2005. Updated information was provided from participating states. Some of the pressing needs identified for Missouri were 1) genetics, 2) land acquisition, 3) surveys, and 4) potential reintroductions.

Detailed management guidelines as provide in the CCA final report were completed and approved by Working Group members. In addition, BMP guidesheet for massasauga rattlesnakes was updated.

Common name: **Ozark hellbender**	Scientific Name: *Cryptobranchus alleganiensis*
State Status: Endangered	Federal Status: Candidate
Goals: Survey, Monitor, and Research	Recovery Leader: Jeff Briggler

The Ozark hellbender is a subspecies of the eastern hellbender. Although not federally listed, this species is declining at the species level throughout its range in the US, and more rapidly declining at the subspecific level in Missouri. In the next five years the Department plans to

- survey river tributaries with existing populations, then resurvey every 5 years
- develop and implement a monitoring plan
- work with local giggers (gigging for suckers and bullfrogs) to report hellbender sightings
- collaborate with St. Louis Zoo and Arkansas State University to develop captive propagation techniques
- collaborate with specialists to determine causes of mortality on larvae and lack of reproduction in adults
- investigate the need for working group to draft a plan of action to reduce threats
- develop educational material for the general public

ACCOMPLISHMENTS

Surveys were conducted throughout late summer and autumn in 2004 on eight rivers within U.S. Forest Service boundaries where limited hellbender information was known. In addition to assessing hellbender status in selected stretches of these rivers, habitat data was documented for future monitoring protocol. Funds for these surveys were provided by USFS and MDC staff volunteers. 179 seven sites were surveyed in approximately 216 river miles over 27 days of efforts. 31 hellbenders were observed during the surveys. This information, as well as obtainable historic hellbender data, was updated into the Heritage Database.

As a result of efforts to increase awareness of hellbenders among department staff, other agencies, and public, the requests for information over the past year has been overwhelming. Within MDC, the Director, Commission, and other administrators were updated on all events involving hellbender recovery. Numerous presentations were provided to MDC field staff, other

agencies, and special interest groups (Audubon, Midwest Herpetological Society, Southwest Missouri Herpetological Society, etc.). Information regarding hellbender recovery was provided in USFS Forest Plan, Fort Leonard Wood Military Base T&E requests, BMP's updates, and MoDOT bridge construction projects. In addition, local anglers and recreationists continue to report hellbender locations and voice their concerns about the decline of hellbenders over the years. Many state newspapers continue to write articles regarding the hellbender decline. Even the Governor's office received letters from concerned citizens regarding the decline of hellbenders. This outreach effort over the past year has definitely increased awareness of hellbenders around the state of Missouri.

MDC continues to collaborate with the St. Louis Zoo for propagation studies. Zoo staff removed 3 hellbenders from the North Fork River in autumn 2004 for the propagation program. In addition, a MDC hatchery will be accessible for propagation use when needed. USFWS and MDC have been providing funds to investigate the potential impacts that trout might have on hellbenders. Due to the uncertainties of trout influence on hellbenders, MDC provided assurances to USFWS to not expand trout stocking areas within Ozark Hellbender streams until more information is collected. Also, potential access locations on rivers with hellbenders are being reviewed by MDC staff to reduce impacts to hellbenders.

The Ozark Hellbender Working Group completed the first draft of the Conservation Strategy, which includes the following topics: 1) captive propagation, augmentation, and reintroduction protocol, 2) monitoring and data compilation, 3) Outreach and Education, 4) Research, and 5) watershed protection and improvement.

The Ozark Hellbender Working Group met in October 2004 at the St. Louis Zoo. Updated information was provided by USFWS, MDC, AR. Game & Fish, and researchers. We discussed the need to finalize the Conservation Strategy and investigated the use of a PHVA (population habitat viability assessment).

The National Hellbender Symposium was held June 19-22 at Gaston's Resort, Lakeview, Arkansas. Participating members provide updates on state status and current research efforts. MDC gave a presentation on the overview of the Ozark Hellbender Working Group. Immediate plans should be to increase hellbender protection in each state through regulations and add hellbenders to CITIES list. Other pressing needs include trout-hellbender studies, hellbender abnormalities, and water quality.

BIRDS

Common name: **Bald Eagle**	Scientific Name: *Haliaeetus leucocephalus*
State Status: Endangered	Federal Status: Threatened
Goals: Monitor and Education	Recovery Leader: Andy Forbes

Consistent with the national trend, both summer nesting populations and wintering eagle populations are increasing in Missouri. During the next five years the Department plans to

- update nesting records in the Natural Heritage Database when information is provided
- establish refuges when necessary to protect nests
- continue to count eagle numbers during the January winter waterfowl counts
- participate in a series of bald eagle interpretive events each winter

ACCOMPLISHMENTS

Consistent with decisions made during 2001, information on nests was only reported opportunistically during 2005. Twenty-five new reports of Bald Eagle nesting activity were received during this time period, of which approximately half of the nests hatched young. Clearly, the breeding population of the species is continuing to increase in Missouri, consistent with trends from across the U.S. A statewide Bald Eagle nest survey is planned for 2006, consistent with decisions made in 2001 to conduct statewide nest counts every 5 years.

Winter bald eagle counts were conducted in counties throughout Missouri in 2005 by automobile, boat, and fixed wing aircraft. Counts were conducted in conjunction with MDC annual mid-winter waterfowl counts. In 2005, eagles detected dropped significantly to 1846, a decrease of 699 from the previous year. However, very poor weather conditions restricted flight over much of survey timeframe, preventing 64 out of 175 routes from being surveyed. Therefore, this drop in numbers detected is not necessarily an indication of a drop in eagle populations.

Seven Eagle Day events were held across the state in 2005. Typically, average attendance for each Eagle Day event, which runs for 1-3 days, is 1000-2000 people. The Chain of Rocks event is consistently the highest drawing event, and has had attendances of over 10,000 people in the past.

No requests for temporary refuges were received or established. The species is has been proposed for removal from the federally threatened list.

Common name: **Cerulean Warbler**	Scientific Name: *Dendroica cerulea*
State Status: Endangered	Federal Status: Region 3 Species of Concern
Goals: Survey and Monitoring	Recovery Leader: Brad Jacobs

This is a riparian forest species in Missouri that has been experiencing a long term population decline, averaging 2.7% annually through the last 30 years as indicated by the Breeding Bird Survey. During the next five years the Department plans to

- summarize historical and recent information from surveys, atlases, and literature on the status of cerulean warblers in Missouri
- in coordination with FWS, other agencies and universities, design, test, and implement a riparian breeding bird survey throughout Missouri and a cerulean warbler survey in northeast Missouri
- develop Best Management Practices for land managers

ACCOMPLISHMENTS

Two survey teams were contracted to conduct canoe surveys again this year. Rivers were very low, so only about half as many surveys as expected were conducted. Data analysis of the annual surveys will begin in FY06 using the data available on the rivers already surveyed.

Common name: **Greater Prairie Chicken**	Scientific Name: *Tympanuchus cupido*
State Status: Endangered	Federal Status: None

Goals: Monitoring and Management	Recovery Leader: Sharron Gough

The greater prairie chicken was added to the state endangered species list in March 1999. This species continues on a precipitous decline that began in the early 1970's. An effort to reverse this trend began in 1984 with the acceptance of the first species management plan, updated in 1991. More recently, the Grasslands Coalition, a progressive action-oriented coalition of natural resource agencies, NGOs and private citizens, began a focused effort to add and improve on grassland habitats in nine key focus areas within prairie chicken breeding range.

In the next five years the Department, as part of the Grasslands Coalition, plans to

- continue to monitor the species population trend in Missouri
- implement prairie management and restoration guidelines to improve prairie grassland habitat
- evaluate additional translocation of birds to previously occupied habitat
- continue habitat assessment and conduct research to resolve management issues
- evaluate the need for pre-listing agreements with landowners
- when and where appropriate, acquire land to protect and manage prairie chickens
- continue a broad-scale landowner education program on prairie management in all Grasslands Coalition Focus Areas.

ACCOMPLISHMENTS

Missouri's resident prairie chicken population was surveyed on all known booming grounds. A slight increase in numbers was noted, due largely to the population associated with Dunn Ranch in NW MO. Most native MO populations continue to decline.

On MDC-owned and managed areas, 11,337 acres were improved for prairie chicken habitat through burning, grazing, brush-removal, tree removal or restoration of prairie. On private lands, 25 landowners were contacted and 4151 acres were improved for prairie chickens. Grassland Coalition partners added another 8500 acres of improved habitat on non-MDC public lands. Grants that have been submitted for prairie chicken habitat management include the Landowner Incentive Program, National Fish and Wildlife Foundation, MO Bird Conservation Initiative and State Wildlife Grants.

Research projects underway that will yield information for improving prairie chicken recruitment success include: Patch Burn Grazing Management & Evaluation projects on 6 prairies; effects of fertilization on prairie plants & insects; vegetation monitoring on Prairie State Park, Taberville and Wah'Kon-Tah prairies; predator exclusion trial on Kearn CA; forb nursery on Pawnee and Wah Kon Tah; and sericea monitoring on most public and NGO prairies.

The Grasslands Reserve Program in MO continued to focus on native prairie. Grasslands Coalition Focus Areas have been dove-tailed with Missouri's Comprehensive Wildlife Strategy plans.

Education and outreach events included an interview from the Springfield Newsleader; 6 burn workshops, 2 patch-burn-grazing workshops, a tour for Women in Agriculture on Pawnee Prairie; prairie chicken workshops for 400 students and one Americorps group on Prairie State Park; prairie chicken viewing experience from blinds for 300 people on Dunn Ranch; and prairie chicken presentations for Discovery Center volunteers and Future Farmers Association teachers. Also, 1000 people attended the Prairie Jubilee on Prairie State Park.

Common name: **Interior Least Tern**	Scientific Name: *Sterna antillarum athalassos*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor	Recovery Leader: Rochelle Renken

The success of nesting colonies on the Mississippi River varies from year to year, affected largely by water levels in the big rivers. During the next five years the Department plans to

- annually monitor least tern colonies on the Mississippi River
- continue to work with the Army Corps of Engineers on the Master Manual and other proposed changes to big river management that could benefit fish and wildlife resources
- actively participate on the Natural Resource Committee's Missouri River subcommittee on Least Terns and Piping Plovers

ACCOMPLISHMENTS

A ground survey for interior least tern nests was performed during June 24 through July 1, 2005. Ground surveys are performed to estimate the number of adult pairs inhabiting sand islands in and adjacent to Missouri within a nesting season. During the 2005 survey, ten islands were searched and 1216 nests were located. The number of nests located in 2005 was similar to numbers observed in 2001 (1460 nests), and greater than numbers observed in 1996 (973 nests), 1997 (350 nests), 1998 (899 nests), 1999 (968 nests), 2000 (722 nests), 2002 (712 nests), and 2003 (695 nests).

The recovery leader attended the Missouri River Natural Resources Committee's least tern and piping plover recovery team meeting in the fall of 2004 as Missouri' representative to the subcommittee, as well as attended the 2005 meeting on Mississippi River dike construction projects with representatives of the US Army Corps of Engineers and representatives of other state fish and game agencies within the Corps' Memphis district.

Common name: **Peregrine falcon**	Scientific Name: *Falco peregrinus*
State Status: Endangered	Federal Status: Species of Concern
Goals: Monitor	Recovery Leader: Brad Jacobs

There is optimism in Missouri following many years of falcon hacking by the World Bird Sanctuary in the St. Louis area and four years of hacking by the MDC in the Kansas City and Springfield areas. During the next five years the Department plans to

- monitor the nesting population and band young when convenient

ACCOMPLISHMENTS

Peregrines are still nesting in both Kansas City and St. Louis. In Kansas City, 4 young hatched in the nest on the Commerce bank building. One fledging died when it collided with a building, one was injured and is under rehabilitation, and 2 are at large. In St. Louis, 2 known nests produced 3 females and 1 male. A recently fledged juvenile (feathers but still with some

down) was discovered in downtown St. Louis, and adults have been seen in the area, but the nest has not been located.

The Associated Electric Cooperative/New Madrid Power Plant released four peregrines in 2004. None of the 2004 release birds were observed in the vicinity in 2005. In a second year attempt, three male and one female hatchling peregrine were banded and placed in the hack box on June 8, 2005, which was moved to a different area on the plant for the 2005 project.

MAMMALS

Common name: **Gray bat**	Scientific Name: *Myotis grisescens*
State Status: Endangered	Federal Status: Endangered
Goals: Monitor, Protect, Reclassification	Recovery Leader: Rick Clawson

The federal Recovery Plan was completed in 1982 and the Department has been a leader in its recovery. Department efforts are led by a state management plan completed in 1992. This species is secure and increasing in Missouri, which appears consistent with the national trend. During the next five years, the Department plans to

- continue to monitor the species population trend in Missouri by surveying Priority 1 maternity caves every 2-3 years and Priority 2 maternity caves very 5-10 years
- train regional staff in appropriate techniques for monitoring and managing gray bats (including bat gate instruction)
- continue to make landowner contacts and provide management assistance to private landowners
- build bat gates and other protective structures at endangered bat cave entrances on both public and private land, providing cost share incentives when possible
- coordinate with the FWS to reconstitute the gray bat recovery team to reevaluate the rangewide status of the gray bat and determine the need to reclassify its federal status

ACCOMPLISHMENTS

Twenty-three gray bat maternity caves in 15 counties were visited in 2004; seven were Priority One and 16 were Priority Two caves. Populations in these caves were comparable to recent populations. Overall in Missouri, gray bat populations are down from maximum historic numbers, but are higher than they were 30 years ago.

Exit flights were taped at three maternity caves in an experimental effort to confirm population estimates based on post-maternity period surveys at caves. On of these caves, the Mary Lawson Cave, was purchased in 2003 and a cave gate was constructed at the entrance in June 2004. Infrared video out-flight counts were conducted and guano piles were measured to estimate grey bat population numbers in the cave. During the summer of 2004, the maternity colony contained about 40,000-54,000 individuals. An out-flight video on May 17, 2005 indicated 23,000 bats, which is approximately correct for the early maternity season and indicated a stable colony. Another video count will be conducted in July 2005 and then subsequent summers.

A cave gate was constructed at Tumbling Creek Cave, a Priority One gray bat maternity cave in Taney County using Wildlife Diversity Funds (WDF). In 2003 we estimated a

population of about 19,000 gray bats, which was up from the last visual count estimate from 1998 of about 12,000 gray bats. Since the removal of an internal cave gate and the construction of the large chute gate at the natural entrance in March 2004, numerous infrared videos of the gray bat out flights were conducted and movements of the bats in the caves were studied. The population has increased to 21,000-37,000 in June/July 2004. The numbers vary from night to night, probably because of emigration and immigration to/from other caves. The results of these studies are expected to be published in 2005/2006. Video estimates will continue.

Common name: **Indiana bat**	Scientific Name: *Myotis sodalis*
State Status: Endangered	Federal Status: Endangered
Goals: Survey, Monitor, Research, Management	Recovery Leader: Rick Clawson

Despite successful protection of wintering caves and a better understanding of summer habitat requirements, this species continues to decline in Missouri. The Department has been a leader in endangered bat recovery for the Indiana bat. The federal Recovery Plan was revised and completed in 1999 but has not yet been finalized. Department efforts are led by the state Management Plan completed in 1992. The Department is adding emphasis on this species through regional coordination teams. During the next five years the Department plans to

- monitor the species population trend in Missouri by surveying Priority 1 hibernacula every 2 years and Priority 2 hibernacula every 5-10 years
- initiate surveys and monitoring in abandoned mines that may be used as additional hibernacula
- conduct surveys on MDC lands for summer maternity roosts in northern Missouri
- create opportunities for landowner contact and provide management recommendations to private landowners
- train interested regional staff in appropriate techniques for monitoring and managing Indiana bats (including bat gate instruction)
- continue to be a leader in Indiana bat recovery through meetings of the Recovery Team (Rick Clawson, federal Recovery Team Leader) and coordination with the FWS and USFS
- coordinate with FWS, Bat Conservation International, and other agencies in conducting research on changes in microclimates of hibernacula, life history, and summer habitat use
- implement Indiana Bat Habitat Guidelines on MDC lands
- coordinate with FWS, other agencies, and universities to further develop Anabat technology to establish presence, habitat use, and movements of Indiana bats
- coordinate forestry research projects that examine impacts of timber management activities on summer roosting and foraging habitat and migrating Indiana bats

ACCOMPLISHMENTS

All Priority One and Priority Two Indiana bat hibernacula in Missouri, as well as two Priority Three hibernacula, a total of 18 caves and a mine, were surveyed during the winter of 2004/2005. The overall population in the state continued to decline, but the rate of loss was not as severe as it had been in the past.

A cave gate was constructed at Martin Cave #1, a Priority Two hibernaculum on Ozark National Scenic Riverways in Shannon County. The project was funded by MDC through a cooperative agreement with the Cave Research Foundation in partnership with private landowners and the National Park Service.

In a study contracted to the University of Missouri, parameters of bat calls that are detected by Anabat detectors were determined in order to refine a calibration protocol for the Anabat. This study will add greatly to the utility of Anabat as piece of field equipment for bat surveys and bat research. The study is ongoing and is partially funded through SWG.

The Recovery Leader attended a USFWS meeting on revisions of the Indiana Bat Recovery Plan and provided input on the current status of Indiana bats and the winter hibernaculum caves. This information is integral to the revision of the Plan.

Common name: **Plains spotted skunk**	Scientific Name: *Spilogale putorius interrupta*
State Status: Endangered	Federal Status: NONE
Goals: Survey, Monitor, Research, Management	Recovery Leader: Jackie DeSanty-Combes

The plains spotted skunk is a subspecies of the eastern spotted skunk. Since 1950, the plains spotted skunk has declined throughout much of range in the Great Plains. The Ozarks are believed to be the stronghold of the remaining population. A statewide survey was initially conducted by MDC in 1992, and a more effort intensive survey is being conducted 2002 through 2003 to determine the species' current distribution in Missouri. During the next five years, the Department plans to

- collaborate with University of Missouri-Columbia conducting statewide field surveys on suitable habitat on private lands and selected MDC lands to verify sightings reported in 2002-2003; and determine habitat use and preferences
- develop reliable survey/monitoring methodology(s), and initiate long-term (5-10 year) monitoring
- develop statewide predictive model based on habitat data
- develop specific management actions for Missouri land managers

ACCOMPLISHMENTS

University of Missouri-Columbia began field work in Fall 2004 to 1) live trap spotted skunk at the center of their range in Madison County; 2) to use the live-trapping in Madison County to validate the usage of remote cameras and track-plates to detect plains spotted skunks in an effort to develop protocols for a broader, state-wide survey; 3) to survey throughout all regions of the state for plains spotted skunk using the protocols and building on the initial distribution data from the 2003 mail survey; 4) to characterize habitat in areas where plains spotted skunks are detected; and 5) to develop predictive habitat models based on this data to be used in future management plans involving plains spotted skunks.

Seventeen plains spotted skunks were live-trapped in Madison County between December 2004 and June 2005. Data collection is ongoing, and surveys in all regions are expected to be completed by June 2006.

Common name: **Black-tailed jackrabbit**	Scientific Name: *Lepus californicus*

State Status: Endangered	Federal Status: NONE
Goals: Survey, Monitor, Management	Recovery Leader: Jackie DeSanty-Combes

Historically, the western and southern one-third to one-half of Missouri was the extreme eastern edge of the species range in North America. Populations peaked in the 1920's and 1930's during habitat disturbances, and studies in 1979, 1987, and 1990 indicate a steady decline in range and numbers. The last reported sighting of a black-tailed jackrabbit in 1995, and this species may be extirpated from Missouri. During the next five years, the Department plans to

- identify existing populations via a mail survey soliciting sighting information from landowners in the vicinity of the 99 sighting locations in the Heritage database
- conduct field visit to locations reported from the mail survey to assess habitat availability
- form a recovery committee to determine where, if any, large tracts of suitable habitat still exists in Missouri
- initiate a long-term (5-10 year) monitoring program
- develop specific management actions for Missouri land managers, possibly including reintroduction

ACCOMPLISHMENTS

In 2005, funds were approved to being a field survey to verify the presence of black-tailed jackrabbits at approximately 20 sighting locations identified during the 2003 mail survey. The project will be between August 2005 and June 2006.

A recovery committee will be formed if existing populations are located. A proposal will be developed to determine habitat use and availability on the current landscape.